RAILROAD GAZETTE

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Contributions.

From the Passengers' Grievance Committee.

To the Editor of the Railroad Gazette:

Twice a year, as I take my family to and from the New England coast, we alight from the train of the New York, New Haven & Hartford Railroad at a large station, where a regular stop is made, and stretch our legs by a walk up and down the platform. Twice a year one of the younger members of the family asks me the name of the place, and as regularly I am at a loss what to reply. The station is a large and important one, the building being something like 400 ft. long, and the platforms extending still further; but when you consult the signboards, in order to ascertain the name of the place, you have the choice between the following descriptions:

1—Adams Express Company.
2—Western Union Telegraph Company.
3—Restaurant.

I used to insist that the name of the station must be Western Union Telegraph Company, because the signs bearing this legend were the smallest and least conspicuous, but my family replied that this was not sufficiently distinctive for the name of a large town. One year I suggested "Adams Express Company," as their sign was the largest and most conspicuous, and latterly I have been clinging to the name "Restaurant," as the signs bearing this inscription in green and gold are the handsomest of the lot; but I cannot persuade my family, or, indeed, myself, that these are the true names of the place.

Several times I have been on the point of asking one of the station employees the name of the place, but as I approach him I feel almost the same diffidence that I should feel in the Grand Central Station if I were to inquire the name of the point at which I had arrived. I cannot help thinking that possibly the place is so important that the local authorities do not think it necessary to put up its name, and I have not yet been able to argue myself into making this simple inquiry on the subject.

There are several stations of almost similar design on the N. Y., N. H. & H., and I think that more than one is destitute of a sign; but this particular station, at which all the trains stop, is certainly the largest of the group. Besides the main tracks there are sidings at each end, from which local trains start, and altogether the place appears to be of importance. Might I shelter myself behind my initials and ask, through your columns, what is the name of this place?

H. T. G.

Cheap Railroads in the South Atlantic States.

To the Editor of the Railroad Gazette:

Residing in one of the South Atlantic states I have been frequently called on in the past ten or twelve years to locate and construct the whole or parts of several lines of railroad intended mainly for lumber roads at the outset, but in some cases designed also to be accommodated ultimately to general traffic of a light sort, and operated as branches to main lines, though held in private ownership or by companies independently organized and controlled. The general aim has been to reduce cost of construction to as low a point as possible, without injury to the working capacity of the roads at fair speeds and with the train loads expected to be hauled.

Economy has especially been practised in graduation, clearing, cross ties, waterways, etc.—in short, everything outside of rails and fastenings—and even these have been made as light as practicable, though they have been looked on as the safest part of the investment. They have been, in some cases, designed to be taken up and sold or moved if the roads should prove unprofitable, provision being sometimes inserted in charters for this purpose.

The general character of the country through which these lines run is quite broken and undulating; high ridges extending in various directions, with deep valleys ranging from a few hundred feet in width to as many thousand, though generally narrow; and heavy lateral gulches or hollows running deep into the ridges and making the work of grading obliquely up and down their sides relatively difficult and expensive.

The difference of elevation, transverse to ridge and stream, amounts often to 150 or 200 ft. in a mile or mile and a half, and more proportionately for greater distances. On one line recently built there was a total fall of about 300 ft. in three miles, and of this over 200 ft. had to be made in a distance of 9,000 ft. from the lay of the land, projecting spurs, etc.; and the rest of the line of nine miles corresponded pretty well with this.

When, as has been the case in some instances, the roads have followed the tops and ridges or course of valleys for the greater part or all of their extent, the work of locating and constructing has been comparatively and often surprisingly easy and light; but very frequently the necessities of traffic, individual interest, etc., have led to the construction of lines "across the country," with corresponding increase of difficulty in the problems of location and construction, the resources and wishes of projectors and builders being considered. To meet the conditions of the case as well as possible, the following details of location and construction have been used:

1. Steep grades have been freely used. In the direction of heaviest traffic, i. e., towards main lines, these have ranged from a practical working maximum of 2.0 ft. to 2.5 or 2.6 ft. per 100, and in the contrary direction 2.75 to 3.25 per 100. Further than this occasional use is made of steeper grades for short distances, or straight lines and light curves, capable of being surmounted by headway; with the result of considerable saving in the aggregate, and especially in the avoidance of rock or hardpan excavation, which are shunned like smallpox by these smaller roads.

Frequent use is made also, on the more level parts of the line, though still gently rolling, of undulating grades, carefully planned and fitted to the ground, and well rounded off and joined at intersection with adjacent grades.

In fixing grades on profiles and ground careful work has been done in reducing cost on light as well as heavy work; repeated adjustments being tried, and comparisons of their results made by the use of tables and profile calculations.

2. Free use is also made of the sharper class of curves—6 deg., 8 deg., 10 deg. and even 12 deg.—where reasonable saving could be effected either in graduation or length of line, especially the former. In this probably there has been greater danger of error than in the matter of grades.

3. In the matter of waterways, on light fills with small drains plank boxes of suitable size and good material, such as heart pine or oak, are used. Under heavier fills with small drains earthen pipes are used. For the larger waterways the grades are generally brought as low as prudence will permit, and low trestles used, with occasional short spans of knee brace or other simple underneath brace, immediately at the streams, when single trestle spans cannot well be used.

Little or no heavy piling is done. Foundations for bents in soft ground are secured by sheet piling subsills and spiking them well with wrought spikes of 6 and 7 in. For the short span bridges of 30, 40 or 45 ft. cribs of 4 or 5 by 16 or 18 ft, well framed with pins and dovetail, are used as foundations for double bents (corbelled) as supports. The cribs are lined inside and out as far as the nature of the ground requires with sheet piling driven by heavy hammer, maul or "dolly," to hard pan or rock bottom (found generally at a depth of a few feet), and are then filled in the same way with clumped piles closely driven. The cribs are well tied across, under vertical posts as well as at ends, and sometimes covered with a tightly framed cover of 6x8, etc., on top, so as to make a sort of caisson on a small scale.

4. Cuts are 12 ft. and fills 10 ft. wide and on many of these roads cross ties of less than usual dimensions have been used with no ill effects noted, and decided saving in cost per tie. Such ties are cut 6 in. thick and 7 ft. long, hewed on two sides. On this point the writer would note that he was led to concur in and approve the use of such ties by observing that on some of the older and larger roads in his vicinity it was for a long time the case that with much heavier engines and loads than these smaller roads used, the 8-ft. ties used were often to be found on fills whose width at the top had gradually run down to such an extent that the ends of ties projected clear of support for as much as 6 or 8 in. at each end, and this, though long continued, was never the cause of accident or injury. This practice of older roads was certainly extreme and has no doubt been largely or wholly done away with of late, with improved methods of maintenance, etc.; but it served incidentally to show how small economies might be effected and justified in some cases where necessity called for them.

5. The work thus roughly described is done as economically as possible. It is often done by hired forces under the general supervision of owners and managers, with foremen employed for the purpose. Sometimes small contracts of a few hundred feet are let, and from this up to the whole line of 10, 12 or 15 miles to small local contractors. These generally prefer to bid on the work "both ways," as it is called, i. e., so much per yard of aggregate cut and fill, with no account of haul or waste and borrow. This is done at a cost generally of from 6 to 8 and 9 cents per cubic yard, depending on the nature of material, with allowance, of course, for solid and loose rock when they occur. State convicts have done a good deal of work at the latter figures, the state bearing all expenses of keeping and guarding the men, and have made money.

On such terms the work of grading some lines and parts of lines has cost about as follows: 6 miles, across country, for about $1,200 or $200 per mile. Seven miles along a ridge, with some undulation, but generally smooth and favorable, for a little less than $100 per mile. Twelve miles, across country, quite broken, at $400 per mile or a little less. Nine miles, across country, in a heavy Piedmont section, $650 per mile for grading. This line has already been referred to as having differences in elevation of 300 ft. in three miles, 200 ft. in 1¾ miles, etc., with some sharp points of cut and fill on the way, and some considerable streams to cross, as well as subdrainage, requiring pipe, etc., and some solid rock, loose rock and hard pan, and was done at a total cost for grading, trestling, etc., ready for track, of $900 per mile. Forty lb. steel rails with good fastenings are used, and the track is generally well laid and kept up.

The total cost of construction varies from $2,500 to $3,000 per mile, sometimes including in this the cost of a locomotive, the rolling stock of a main line being used, except a flat or two perhaps and a light passenger coach.

The engineering outlay suffers or enjoys corresponding economy. The engineer is employed by day, week or month, to locate the line, establish grades, give plans for trestles, etc., and sometimes to stake out the work (always, of course, in case of contract work and heavier work), though sometimes he makes out his center cuts and fills and turns them over to the manager for marking. The company force or contractor then grades the line and track is laid, etc., with never an engineer to see it again from the time he left it in the woods, and all is fairly well done and turns out well.

C. H. S.

The Superintendent of Bridges and Buildings.

In the latest bulletin of the University of Wisconsin appears an address bearing the above title, delivered before the students of that university by Mr. Onward Bates. As Mr. Bates is Engineer and Superintendent of Bridges and Buildings on the Chicago, Milwaukee & St. Paul, and has been President of the Association of Superintendents of Bridges and Buildings, he is qualified to speak with authority on this subject, which evidently is a subject of deep interest to him. In his address, he endeavors to give to the young men some notion of the importance of the work of the superintendent of bridges and buildings, of its variety, of the growing dignity of the place and its probable development into one of the important permanent offices of the great railroads. The title is comparatively new, but the number of men holding this title is constantly increasing. So far the Superintendent is oftener a mechanic than a professional man, and has generally risen from the rank of carpenter. The position is one, however, that may properly be held by an engineer, and it is fast becoming such that its holder must be an engineer. The Superintendent of Bridges and Buildings is responsible for the care and maintenance of a great variety of structures, some of which are of much importance, and on the great roads the money spent under his direction may amount to a million dollars a year or more. We cannot better give Mr. Bates' notions of the dignity of this position than by quoting his concluding paragraph, which will be followed by a few other extracts from the address:

I am clearly of the opinion, based on my own experience and observation, that the engineering profession is in its infancy, and that it has a great future before it. A profession covering so wide a range of subjects as ours must necessarily be developed in special lines. Life is too short for a man to be all kinds of an engineer, and if the young men of to-day attempt that they will be something like the man who was jack of all trades and consequently was master of none. In each of the special lines into which the profession may be divided, it is essential that practical knowledge shall go with theory, and my opinion of the future of the profession is based on the belief that this fact has not heretofore been sufficiently recognized, and that in the future it will be. After ten years' personal experience in this work, supplemented by more than

twenty years' preparatory experience, I feel competent to say that in the bridge and building department there is a field for professional occupation which has been underestimated by the railways as well as by the public. It does not necessarily follow that an engineer's ambition shall be confined within the limits of the bridge and building department, and if he wishes to go higher in the same general line of occupation, there can be no better preparation than he will receive in that department. These conditions stand out so plainly before me that I confidently expect to see the position of Superintendent of Bridges and Buildings advanced, both in the estimation in which it is held, and in the pay which it will command.

Inspections.

One of the most difficult duties of the Superintendent is to secure proper inspection of bridges. Wooden bridges are built with a margin of strength when new to make up for deterioration by partial decay, and it is always a difficult problem to determine just what repairs shall be made on a wooden bridge, and how long it shall be used before it gets into that condition which requires its renewal. The bridge cannot be continued in service after the limit of safety is reached, and it is extravagant to renew it before renewal is actually necessary. No rules can be made which will enable an inspector to fix the exact date for the renewal of a wooden bridge, and safety and economy require that he shall possess both judgment and experience. As inspection is so much a matter of judgment, the opinion of one man should not determine the repairs to be made. There should never be less than two men on an inspection trip, and as there are generally more in the party, an effort should be made to have the inspection notes represent their combined judgment. The Superintendent should make these inspections himself as often as is practicable. If the length of line under his charge is not too great he should be his own principal inspector. Where his other duties will not permit him to take the full charge of inspection, he should at least make inspections frequent enough to be able to check the reports of his inspectors from his personal knowledge of the structures.

There should be at least one official inspection of bridges each year, made for the purpose of determining renewals or extensive repairs in the succeeding year, and another inspection about midway between the official inspections in two succeeding years. This provides for two regular inspections per year. When structures become old and require watching it will be necessary to make inspections at shorter intervals. It should be impressed upon all subordinates that they carry responsibilities for the condition of the bridges under their care, and each in his turn is to make such additional inspection as is proper. No official inspection will relieve a division foreman of responsibility for the bridges on his division.

Business Sense Required.

A superintendent must be a good deal of a business man, planning to get the right kind of material in each case, and at the same time assisting the Purchasing Agent in his endeavor to buy material for the company at low rates. In the expression that "all material must be first class," it is understood that it must be so for the use to which it is put, for it is extravagance to use material of a higher grade than is required in the work. To illustrate this, let us consider the case of concrete foundations. In some cases a strong concrete made of the best Portland cement will be required. In others, what may be called an inferior concrete will answer the purpose as well as a better one. If a culvert is to be built, with the side walls supported on concrete footings, and with the bottom of the culvert paved so that there is no danger of the footings being undermined, the problem then is to have the footings of sufficient strength to carry the superimposed weight and distribute it on the soil at a depth below the action of frost. If the material that is excavated for such footings were of hard compacted sand and gravel, we would not dig into it and would consider ourselves fortunate to have so good a foundation. Now if the material is not so good and is to be removed and replaced by a concrete footing we only need one that will answer the purpose as well as the compacted gravel. In such a case a suitable and very cheap concrete can be made by taking the ordinary gravel that is used in ballasting tracks, provided it is free from earthy matter, adding sand if necessary, and natural cement, mixing and placing as with ordinary concrete made with broken stone. In many cases there will be sufficient sand found with the gravel as it comes out of the pit. If not, sand can be added, and as natural cement is a cheap product the resulting concrete will be all that is required, and the cost of it surprisingly low. I have mentioned this in some detail because work is frequently made more expensive than is necessary when the specifications prepared in a general office are carried out by the local workmen and the latter are not permitted to use their own judgment.

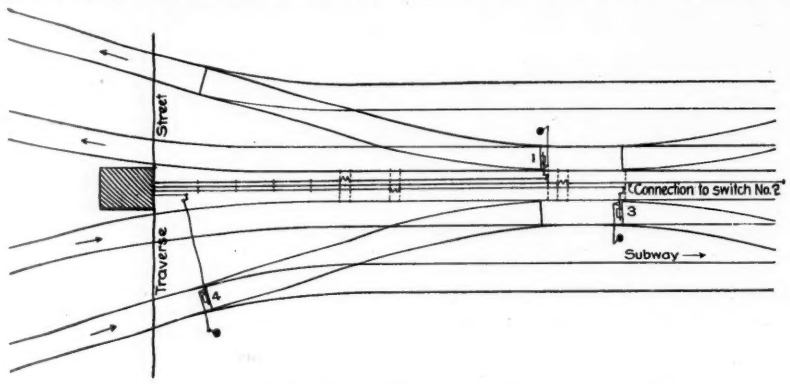
The superintendent will require not only considerable knowledge as to processes of supplying water, but also good judgment and discrimination, or he will be at the mercy of the dealers in the various kinds of pumps and apparatus for raising water. The statements of some of these dealers are almost beyond credence, and yet they are put forward with such plausibility that they are almost convincing. A recent circular issued by a large manufacturing company descriptive of its oil or gas engine makes the claim that after using crude oil to run the engine there is a residue of superior oil which is worth as much as the first cost of the crude oil, and attempts to prove its statement by the report of a test at a water station on one of our leading railways, in which it is stated that water was forced through 1,000 ft. of pipe into a tank at an elevation of 55 ft., at the total expense of running the oil engine plant of 42 cents per day, and that the machine oil by-product saved was worth $1.61, or a net profit per day of $1.19. An unsophisticated superintendent might accept such a representation and conclude that the more of such engines he had on his road the more money his company would make. Probably the next man who has an oil or gas engine to sell will have as good or a better statement to advance. There are two lessons to be learned from such advertisements; one is that the statements of railway supply men are not to be swallowed without a grain of salt, and that the superintendent must use discrimination in adopting these devices. The other lesson is that a superintendent should be careful in making a statement to be published as an advertisement of some special article which railway companies use, and if it is necessary to make any statement that it shall be one which he can stand by.

Contract Work.

No matter what efforts are made to secure proper inspection, work which is to be covered up is especially bad to be contracted for. It is all right to make an earth embankment by contract because the opportunity is generally lacking to skimp the work, but that is not the case with masonry and foundation work and with building work generally. I am opposed to contract work in a bridge and building department, because I believe that the railway company will get more nearly what it wants, and more value for its money, by doing its own work in a well organized department.

Value of the Training.

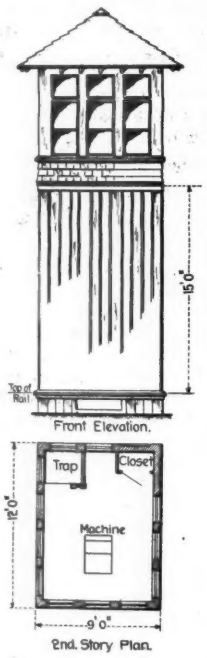
The problems which he will encounter in the erection of bridge work, putting in foundations and building piers and abutments for bridges and masonry culverts are fascinating to one who is naturally fond of construction, and if this is not so, it is evidence that he is misplaced as Superintendent of Bridges and Buildings. He has to contend with the elements, and in his field work he is acquiring the very best of experience to prepare him for higher professional occupation. These problems are so varied in character and cover so wide a range of experience that I feel warranted in the statement that a few years at the head of a bridge and building department will be of exceptional value to any young engineer in preparing him for the higher offices as designer and manager of important undertakings.



Switches in Street Railroad Tracks at Haymarket Square, Boston.

A Switch Tower for a Street Railroad.

At the northerly terminus of the Boston Subway, near the site of the old Haymarket Square station, the switches of the street (surface) railroad tracks have been connected with levers, grouped in a cabin at the north side of Traverse street, and the arrangement of the connections is shown in the accompanying drawing. This plant is the first one of the kind that we have seen. The apparatus was furnished by the Union Switch & Signal Co., of Swissvale, Pa. Mr. A. L. Plimpton, engineer of the road, the Boston Elevated, informs us that the economy and convenience of this arrangement is highly satisfactory, and he believes that similar concentration of levers would be advantageous at many junctions of street surface railroads.



As will be seen by the drawing, only facing point switches are worked from the tower, and there are no signals or interlocking. When the apparatus was first put in, pot signals were attached to all the switches, working automatically with the rails, but it was found that the motormen had acquired the habit of looking at the rails themselves, and that the signals were unnecessary. At night the street lamps give all the light necessary. As cars pass over these switches a good deal of the time at intervals of not more than five or ten seconds, the number of movements required is very large, so that it has been found necessary to furnish the very best material and structures.

A Trial of Pneumatic Tools.

On Oct. 12 and 13 a trial of a number of the latest tools of the Chicago Pneumatic Tool Company, as applied to boiler and firebox work, was made at the New York, Chicago & St. Louis shops near Stony Island avenue, Chicago, representatives of the makers, the New York, Chicago & St. Louis, and the Chicago & Northwestern being present.

The air pressure available was 80 lbs. per sq. in., and the trials of the tools on tube work were made with a locomotive tube sheet in which sections of 2¼-in. tubes, about 8 in. long, were fitted with copper ferules, corresponding to the usual practice at the firebox tube sheet. The various operations were timed, but, as the workmen were not familiar with handling all the new machines, it is quite likely that the figures given below do not represent what might be accomplished after the men had become accustomed to operating these tools.

The compressed air motors tried were those which for some time past have been used for drilling and boring, and have been previously described in the Railroad Gazette, excepting that the Whitelaw motors used could be reversed. The machines tried consisted of a Boyer No. 3 motor, weighing 24 lbs., which is non-reversible; a No. 8 Whitelaw reversible motor, which is a large machine weighing 30 lbs. and intended especially for marine and stationary boiler work, and a No. 7 Whitelaw reversible motor, which weighs 19 lbs., and is of a size suitable for locomotive work. The Boyer pneumatic hammer used for beading tubes was one which had been in service in the New York, Chicago & St. Louis shops during the past three years, during which time, we are told, it has required neither repairs nor renewal of parts. The attachments used for rolling and cutting the tubes have been used in the same shops a short time, and were designed by Mr. John Mackenzie, Superintendent of Motive Power of that road. These attachments will be shown in a later issue. It may be stated, however, that with the new cutter the tube is decreased in length but 2 in. in cutting out, while with the usual cutter the length is decreased about 6 in. As each inch of tube costs approximately one cent, this saving in itself is considerable.

With this roller and a Boyer motor six tubes were rolled in 3 minutes; with the large Whitelaw No. 8 six tubes were rolled in 3 minutes and 5 seconds, and with the smaller No. 7 Whitelaw motor six tubes were rolled in 1 minute and 38 seconds, and ten tubes in 2 minutes and 37 seconds. With the same roller tubes can be rolled by hand at the rate of about one every 2 minutes, but considerably more time is required where the usual roller with a drifting mandrel is used. The fast work of the small Whitelaw machine is undoubtedly due to its small size, and the fact that it can be quickly reversed even when running at high speeds. It was shown that from 15 to 20 seconds each was the time needed to bead tubes with the Boyer hammer.

With the new tube cutter and the No. 7 Whitelaw motor in one case five tubes were cut in 2 minutes and 50 seconds, and in another trial in 3 minutes and 15 seconds. It was also shown that the No. 7 Whitelaw machine has sufficient power to drill 2-in. holes in steel.

On account of the uniform work done by the improved tube rollers and beading tools in connection with compressed air motors, Mr. Mackenzie states that the mileage of a set of tubes on the New York, Chicago & St. Louis has been increased about 10,000 miles, they are now not troubled by leaky tubes, while the cost of the work has been materially decreased.

Ten-Wheel Engines for the Boston & Maine.

The Manchester Locomotive Works, Manchester, N. H., have recently received from the Boston & Maine Railroad Company an order for six 10-wheel freight engines, simple. These are to be equipped with Midvale tender tires and connecting rods and axles, with Hancock inspirators, French springs and Cambria (Coffin process) pins and piston rods. The general appearance of the engines is given in the engraving from a photograph and a descriptive specification follows:

Boston & Maine Ten-Wheelers—Manchester Works.

Gage	4 ft. 8½ in.
Fuel	Soft coal
Weight on drivers	101,000 lbs.
" " truck wheels	33,000 lbs.
" total	134,000 lbs.
" tender loaded	86,000 lbs.

Wheel base, total, of engine	24 ft. 5 in.
" " driving	14 ft. 0 in.
" " total (engine and tender)	49 ft. 9 in.
Length over all, engine	37 ft. 1 in.
" " " total, engine and tender	59 ft. 0 in.
Height, center of boiler above rails	7 ft. 11½ in.
" of stack " "	13 ft. 9 in.
Heating surface, firebox	144.5 sq. ft.
" " tubes	1,852.5 sq. ft.
" " total	1,997 sq. ft.
Grate area	28 sq. ft.
Drivers, diameter	63 in.
" centers—Main, cast steel; front and back, steeled cast iron.	
Truck wheels, diameter	30 in.
Journals, driving axle	8 in. x 10 in.
" truck "	5½ in. x 10 in.
Main crank pin	5½ in. x 6 in.
Cylinders, diameter	19 in.
Piston, stroke	26 in.
" rod, diameter	3¼ in.
Piston rod packing	Metallic
Main rod, length center to center	9 ft. 11⅛ in.
Steam ports, length	18 in.
" " width	1¼ in.
Exhaust ports, length	18 in.
" " width	2¾ in.
Bridge, width	1¼ in.
Valves, kind of	Slide, balanced
" gratest travel	5¾ in.
" outside lap	⅞ in.
" inside lap or clearance	Line and line
" lead in full gear	0 in.
" " constant or variable	Constant
Boiler	Extended wagon top, radial stays
" working steam pressure	180 lbs.
" material in barrel	Carbon steel
" thickness of material in barrel	5/16, 9/16 and 11/16
" diameter of barrel..Outside smallest course,	58⅛ in.
Seams	Horizontal butt jointed, sextuple riveted
" circumferential	Double riveted
Thickness of tube sheets	½ in.
" crown sheets	⅝ in.
Crown sheet	Radial stays, 2 front rows turnbuckles
Dome, diameter	30 in.
Firebox, length	8 ft. 0 in.
" width	3 ft. 6⅛ in.
" depth, front	70 in.
" " back	61 in.
" material	Carbon steel
" thickness of sheets...Back, top and sides,	⅜ in.
"	With brick arch
" water space....Width, front, 4 in.; sides,	3½ in.; back, 3 in.
Grate, kind of	Finger, rocked in 2 sections
Tubes, number	267
"	Lap welded charcoal iron
" outside diameter	2 in.
" length over sheets	13 ft. 7⅛ in.
Smokebox, diameter	61 in.
" length	58½ in.
Other Parts.	
Exhaust nozzle	Double
" "	Permanent
" " diameter	Equivalent to 3⅜ in., 3 5/16 in. and 3 7/16 in. diameter
" " distance of tip above or below center of boiler	1¼ in.
Netting, wire or plate	Perforated plate
" size of mesh or perforation	1½ in. x ¼ in.; apart ¼ in.
Stack	Straight, 15⅝ in. diameter
" height above smokebox	3 ft. 3 in.
Type	Six wheel, swivel trucks
Tank capacity for water	4,000 gallons
Coal capacity	Seven tons
Kind of material in tank	¼ in. steel
Thickness of tank sheets	¼ in.
Under frame	Iron
Truck..Center bearing with wooden beam; side springs pinned to rocker; rigid center	
Truck spring	With lug band for rocker pin
Diameter of truck wheels	33 in.
Axle journals	4¼ in. by 8 in.
Distance between centers of journals	75 in.
Diameter of wheel fit on axle	6⅜ in.
Diameter of center of axle	4¾ in.
Type of truck bolster..Wooden beam 8 in. by 12 in., supported at ends by truss bars bolted to journal boxes.	
Names of Makers of Special Equipment.	
Wheel centers..Cast steel of American Steel Casting Co.	
Sight-feed lubricators	Selbert improved triple E.
Safety valve	3-in. Ashton muffled
Muffler	3-in. Ashton, 180 lbs.
Steam heat equipment..Consol'd system, Sewall couplers	
Reducing valves	Mason Regulator Co.
Sanding devices	Leach & Houston
Injector	2 No. 8 B improved Hancock inspirators
Driver brake equipment	Westinghouse and American
Tender brake equipment	Westinghouse
Tender brake beam	Oval Brake Beam Co.
Tender brake shoe	Diamond S
Driver brake shoe	B. & M. style
Air pump	9½ in. Westinghouse
Air pump governor	Westinghouse
Steam gages	Star Brass Co.
Eng. truck springs..French & Co., 3½ in. by 5/8 in., 18 plates	
Driving springs..French & Co., 4½ in. by ¾ in., 15 plates	
Tender springs....French Spring Co., C 48 in. (lug bands)	
Piston rod packings—United States Metallic Packing Co.	
Valve " " " " " "	

Ten Wheel Locomotive for the Boston & Maine.
Built by the MANCHESTER LOCOMOTIVE WORKS, *Manchester, N. H.*

Stresses in Rails Under Moving Loads.

In our issue of May 20, page 351, appeared a description of an arrangement which Mr. P. H. Dudley has devised for measuring stresses in rails under moving loads, which arrangement he has called the "stremmatograph." In that description appeared records, more or less complete, of a number of actual observations. We are permitted now to publish records made during the hot weather of June and July. The discussion of the observations which follows is written by Mr. Dudley.

The distribution of stresses through the rails in taking up the effects of the wheel loads and transmitting them to the ties, ballast and road bed, are subject to more conditions than has been generally considered. The rail is a long continuous girder, on flexible supports, no two of which are likely to give the same result. The span of the deflection of the rails is longer than the span between the centers of the ties; as a rule, usually beyond the outside edges, the wheel spacing being one of the controlling factors.

While the experiments now demonstrate that the stresses in a stiff rail under the wheel base of an engine, tender or car, should sum up correctly for the weight at the center of gravity, the stresses per wheel do and may have wide variations. A series of instructive tests has been made on the 100-lb. rails on one of the outbound tracks near the Grand Central station. Primarily these tests were made in the development of the stremmatograph and its accessories, but they now possess sufficient value for publication, especially in regard to the effects of temperature and tamping.

The portion of the track used was at Forty-ninth street, 1,000 ft. from the station. It forms the connection between two main cross-overs. From 105 to 110 passenger trains a day pass over this piece of track, and when not required for their service, it is in constant use by locomotives for the outbound trains and for drilling cars to and from the station. The approximate tonnage passing over the track is over 2,000,000 tons a month. In October, 1897, the track was raised, 2 in. of new stone ballast being put under the oak ties. Each tie has a tie plate under the rail.

A test was made on the rail, under the Empire State Express locomotive 870, Dec. 29, 1897; temperature 23° Fahr. The rail was not only firm on the ties, but was under some tension due to the low temperature.

The 36-in. splice bars on the 100-lb. rails are not only very stiff vertically and laterally, but hold the ends of the rails so firmly that they do not render easily in the splice bars, either on a rising or falling temperature, a stress of compression or tension being set up in the rail.

The apparent stresses due to wheel loads in this December test were given May 20 for the locomotive, but are repeated here:

		Lbs.	
Engine.	Compression in front of pilot	1,322	
	Tension under front truck wheel	5,947	
	Compression between truck wheels	1,652	
	Tension under rear truck wheel	3,304	
	Compression between truck and front driver	3,139	34,692
	Tension front driver	8,425	
	Compression between drivers	2,478	
	Tension rear driver	6,443	
Compression between driver and tender truck		3,965	
Tender.	Tension front tender wheel	4,460	
	Compression between truck wheels	1,487	
	Tension rear tender wheel, front truck	4,460	
	Compression between trucks	2,979	26,123
	Tension front wheel, rear truck	4,130	
	Compression between wheels	1,156	
	Tension rear wheel, rear truck	3,469	
Compression between tender wheel and first car wheel		2,000	
			60,815

The stresses per wheel are low and quite uniform for the loads. The small stresses under the front truck wheel show at once that the rail was very firmly supported and was not loose on the ties. The rail being under tension before loading, the actual stresses of tension in the rail were higher than indicated, while the work of the wheel loads in producing compression are not fully measured, as would be expected. The total amounts of the stresses obtained for the locoomtive are too low by the amounts not measured, due to the tension. This was estimated from other tests at approximately 7,000 lbs. The tension set up in the 100-lb. rail in this case was of little practical importance, for the section could carry the increased stress and much more without endangering the rail on the coldest nights.

The tension set up in rails of lighter sections in falling temperatures, before they render in the splice bars, is a very important matter, as indirectly it is responsible for a majority of the cracked or broken rails, which almost invariably occur during falling temperatures of considerable range. Records and dates of broken rails taken by Mr. Dudley for a number of years, when compared with the dates of decided falling temperatures, are found to practically coincide. As soon as the temperature rises, relieving the rails from tension or putting them in compression, the breakages cease, except in cases of a development of a check which commenced in a falling temperature. Probably there should be more attention paid to relieving the tension in rails for falling temperatures. Instead of screwing up the bolts of the splice bars as the thermometer falls, some bolts should be loosened and the rails relieved of the tension set up before they render in the splice bars, in November and December.

When the June tests were made, the track had not been tamped or surfaced by the trackmen since the preceding October. Over 16,000,000 tons had been carried over the rails since that date, or 12,000,000 tons since the previous test. That the track was in any condition for a test was due principally to the large mechanical element of stiffness in the 100-lb. rails. The rails were still in surface to the eye, though, of course, they were looser on the ties and the latter looser in the ballast, than in the test of six months previous. The temperature in a companion railhead for the same exposure was 90°, the rail being in compression. Locomotives 870 and 885, of the same class, with their trains, passed over the rail and instrument, the apparent stresses being given below in records Nos. 1 and 2.

Both locomotives originally had 78-in. drivers. Subsequently 84-in. drivers were put under 870, increasing her weight 2,000 lbs. over 885. Since the December test, air brakes have been applied to the engine trucks of 870, which adds more to her weight.

The apparent stresses under the locomotive on June 28 differed 1,870 lbs., which, in a large part, is due to the difference in weight. While the engine truck carries now more weight than formerly, the increased stresses under the front truck wheels and the much larger stresses of compression show that the rail and ties were much looser than in the December test. The fact that the stresses in the rails increase as the rails and ties become loose from service, has long been understood and has had much to do with raising the standard of maintenance of way in the last 20 years. It is of interest to state that a few years ago, before even 80-lb. rails were put in the Grand Central yard, owing to the supposed difficulty of working the switches from the tower, this outbound track had 4½-in. 65-lb. rails; and two sets of chestnut ties were cut out under those rails in one year. The stiffness of the 100-lb. rails when used for switches prevents them from taking a set under the traffic, and they move easier than the former lighter rails.

The estimated loads in the Empire State Express June 28 were 20,000 lbs. in car 424; 11,000 lbs. in coach 936, 10,000 lbs. in coach 914, and 7,000 lbs. in parlor car 118. These estimates do not cover supplies in lockers or tools.

In estimating the stresses for the different cars, the stresses of compression between the cars are divided between the trucks. The shocks which are often noticed between the trucks in the center space of the car do not give the full measure of the stresses which produced them when one-half or two-thirds of a rail length away, but that they correspond so closely is due in a great measure to the stiffness of the three-tie 100-lb. splice bar.

The highest stresses shown in the 100-lb. rail, even after the large tonnage which has passed over them since they were tamped, are less than would occur in a 5-in. 80-lb. rail, in the best condition, and are distributed over a longer space in the roadbed. The value of stiff rails is not alone in increasing the span of the bending rail under the wheel, but in the large amount of the wheel load effects taken up in work in the contrary flexure of the rail either side of the wheel, so that there is not so large concentration of the load per tie as occurs under weaker rails. The

saving in ties and the less labor required in maintaining the track prove this beyond question.

To see whether the stresses in the rail would be reduced by tamping a portion of the rail near the stremmatograph, the ties under 24 ft. of the rail were tamped on the outer ends and under the rail seat. The centers of the ties and the portions under the opposite rail were not tamped. The deflection of five ties either side of the stremmatograph were reduced about $\frac{1}{16}$ in. before tamping. These measurements were from $\frac{1}{8}$ in. to $\frac{3}{16}$ in.

On July 21 the test was made. The temperature was high. By 8.30 a. m. a thermometer inserted in the center of a 100-lb. rail head indicated 110° F. The rail in the track did not render in the splice bars and was under greater thermal stress than on June 28. Locomotives 870 and 898 of the same class and weight passed over the rail with their trains. (See records Nos. 3 and 4.)

The stresses for the engines are practically the same as for June 28. For the tenders, the rail being held down forward by the engine and back by the trucks of the following car, there was a reduction in the stresses.

For the cars the rail had been put out of surface, raising the rail at the stremmatograph and loosening it either side, increasing the total stresses to carry the loads. To reduce the stresses in the rails by surfacing the track, several rail lengths must be surfaced for the train.

The stresses under the truck wheels of the long coaches are not likely to be as uniform per truck as for the engine, when referred to the center of gravity of the car, owing to the action of the couplers and buffers, and only one truck being on the middle of a 30-ft. rail where the stresses have been taken in these records. While by construction the loads are supposed to be equally distributed per wheel, this does not insure equal stresses in the rail. If the rail is loose or not stiff for the loads, the leading wheel of

Stremmatograph Record.—1.

New York Central & Hudson River Railroad; Empire State Express, train number 51, leaving the Grand Central Station, New York, 8.30 a. m., June 28, 1898. Rail 6 in. deep, 100 lbs. per yard. Instrument applied on an outside rail of a 3° curve above Forty-ninth street.

Speed, miles per hour 19
Temperature ..... 90° F
Locomotive No. 870 and tender ..... Weight 202,000 lbs.
Combination baggage and smoker ..... Weight 95,000 "
Vestibule coach, No. 936 ..... Weight 86,200 "
Vestibule coach, No. 914 ..... Weight 82,000 "
Wagner car, No. 118 ..... Weight 94,950 "

The apparent mean extreme fiber stresses per square inch in five inches of the length of the base of the rail were as follows:

		Pounds.			
ENGINE. Truck.	Compression in front of truck wheel	2,362			
	Tension under front truck wheel	13,227			
	Comp. between front and rear truck wheel	6,850			
	Tension under rear truck wheel	7,086	59,665		
ENGINE. Drivers.	Comp. between rear truck and front driver	5,669			
	Tension under front driver	8,267			
	Compression between front and rear driver	7,086			
	Tension under rear driver	6,141	27,163	87,828	
	Comp. between r. driver and f. tender wheel	5,669			
TENDER. F. T.	Tension under front tender wheel	4,960			
	Compression between front truck wheels	2,834			
	Tension under rear tender wheel front truck	5,905			
	Compression between front and rear truck	5,432	38,103		
TENDER. R. T.	Tension under front tender wheel rear truck	4,488			
	Compression between front and rear wheels	3,307			
	Tension under rear tender wheels	6,377			
	Comp. between r. tend. wheel and car wheel.	4,015			
FIRST CAR. F. T.	Tension under front car wheel	7,086			
	Comp. between front and middle wheel	3,307			
	Tension under middle wheel	5,905	32,006		
	Comp. between middle and rear wheel	3,543			
	Tension under rear truck wheel	7,795			
	Compression in rear of wheel	2,362			
	Comp. in center of space between trucks	472			
	Compression in front of first truck wheel	945			
FIRST CAR. R. T.	Tension under front wheel	11,574			
	Comp. between front and middle wheels	3,307			
	Tension under middle wheel	5,196	33,304		
	Comp. between middle and rear wheels	2,598			
	Tension under rear wheel	8,503			
	Comp. between trucks of 1st and 2d cars	2,362			
SECOND CAR. F. T.	Tension under front wheel of truck of 2d car.	6,614			
	Comp. between front and middle wheel	3,307			
	Tension under middle wheel	2,834	23,083		
	Comp. between middle and rear wheel	2,834			
	Tension under rear wheel	5,432			
	Compression in rear of wheel	709			
SECOND CAR. R. T.	Comp. in center of space between trucks	472			
	Comp. in front of wheel of rear truck	1,890			
	Tension under front wheel	8,976			
	Comp. between front and middle wheel	4,015			
	Tension under middle wheel	4,724	27,163	50,246	
	Comp. between middle and rear wheel	2,362			
	Tension under rear wheel	3,779			
	Comp. bet. r. t. of 2d car and f. t. of 3d car.	2,834			
THIRD CAR. F. T.	Tension under front wheel of third car	5,196			
	Comp. between front and middle wheel	472			
	Tension under middle wheel	3,307	10,120		
	Comp. between middle and rear wheel	1,181			
	Tension under rear wheel	5,432			
	Compression in rear of wheel	1,643		45,900	
	Comp. in center of space bet. trucks..Shocks	472			
THIRD CAR. R. T.	Comp. in front of wheel of rear truck	709			
	Tension under front wheel of rear truck	10,629			
	Comp. between front and middle wheels	1,890			
	Tension under middle wheel	1,890	28,810		
	Comp. between middle and rear wheels	2,362			
	Tension under rear wheel	8,267			
	Comp. bet. r. w. of 3d car & f. w. of 4th car.	2,126			
FOURTH CAR. F. T.	Tension under front wheel of fourth car	7,322			
	Comp. between front and middle wheel	3,071			
	Tension under middle wheel	3,543	23,976		
	Comp. between middle and rear wheel	3,071			
	Tension under rear wheel	4,017			
	Compression in rear of wheel	1,417			
FOURTH CAR. R. T.	Comp in center of space bet. trucks..Shocks	472			
	Compression in front of truck wheel	945			
	Tension under front wheel	9,684			
	Comp. between front and middle wheel	1,890			
	Tension under middle wheel	7,795	29,762	53,736	
	Comp. between middle and rear wheel	2,834			
	Tension under rear wheel	5,905			
	Compression in rear wheel	709			

Instrument returned to Zero after passage of train.

Stremmatograph Record.—2.

New York Central & Hudson River Railroad; Adirondack and Montreal Express, train number 57, leaving Grand Central Station, New York, 8.33 a. m., June 28, 1898. Rail 6 in. deep, 100 lbs. per yard. Instrument applied on outside rail of a 3° curve above Forty-ninth street.

Speed, miles per hour 19
Temperature ..... 90° F.
Locomotive No. 885 and tender ..... Weight 200,000 lbs.
Baggage car No. 1,912 ..... Weight 53,560 "
Smoking car No. 2,344 ..... Weight 51,900 "
Vestibule coach, No. 938 ..... Weight 81,400 "
Wagner car No. 133 ..... Weight 96,300 "
" " " 68 ..... Weight 103,200 "
" " " 123 ..... Weight 98,500 "

The apparent mean extreme fiber stresses per square inch in 5 in. of the length of the base of the rail were as follows:

		Pounds.			
ENGINE. Truck.	Compression in front of truck wheel	3,307			
	Tension under front truck wheel	10,865			
	Comp. between front and rear truck wheel	6,377			
	Tension under rear truck wheel	6,377	58,459		
ENGINE. Drivers.	Comp. between truck wheel and front driver.	5,905			
	Tension under front driver	4,960			
	Compression between drivers	8,031			
	Tension under rear driver	9,448		95,898	
	Comp. bet. r. driver and f. wheel of tender	6,877			
TENDER. F. T.	Tension under front tender wheel	3,071			
	Comp. between tender wheel and front truck.	3,779			
	Tension under rear tender wheel front truck.	4,488	37,439		
	Comp. between front and rear tender truck	5,669			
TENDER. R. T.	Tension under front tender wheel rear truck.	4,489			
	Comp. between wheels of rear tender truck	3,543			
	Tension under rear tender wheel	7,086			
	Comp. bet. tender wheel and front car wheel.	4,253			
FIRST CAR. F. T.	Tension under front wheel of car truck	6,877			
	Comp. bet. front and rear wheel of truck	8,071			
	Tension under rear wheel of truck	5,669	18,896		
	Compression back of wheel	1,653			
	Comp. in center of space bet. trucks..Shocks	1,890			
FIRST CAR. R. T.	Comp. in front of wheel of rear truck	2,472		34,479	
	Tension under front wheel of truck	4,253			
	Comp. between front and rear wheel	8,071	15,583		
	Tension under rear wheel of truck	8,071			
	Comp. bet. trucks of first and second cars	1,653			
SECOND CAR. F. T.	Tension under front wheel of second car	6,850			
	Comp. between front and rear wheel	2,125			
	Tension under rear wheel of truck	8,779	16,178		
	Compression in rear of wheel	1,890			
SECOND CAR. R. T.	Comp. in center of space bet. trucks..Shocks	708		35,193	
	Comp. in front of wheel of rear truck	1,181			
	Tension under front wheel of rear truck	8,976	19,015		
	Comp. between front and rear wheel	2,598			
	Tension under rear wheel	4,488			
	Comp. bet. trucks of second and third cars	3,543			
THIRD CAR. F. T.	Tension under front wheel of third car	6,614			
	Comp. between first and middle wheel	1,890			
	Tension under middle wheel	5,196	25,155		
	Comp. between middle and rear wheel	2,834			
	Tension under rear wheel	4,960			
THIRD CAR. R. T.	Compression in rear of wheel	1,653		49,721	
	Comp. in center of wheel space..Shocks	236			
	Comp. in front of wheel of rear truck	1,417			
	Tension under front wheel of rear truck	7,322			
	Comp. between front and middle wheels	2,126			
	Tension under middle wheel	4,253	24,566		
	Comp. between middle and rear wheel	3,307			
	Tension under rear wheel	4,488			
FOURTH CAR. F. T.	Comp. bet. r. w. of 3d & f. w. of 4th car	3,307			
	Tension under front of fourth car	4,015			
	Comp. between fro middle wheel	4,015			
	Tension under mid wheel..Shocks	2,126	23,383		
	Comp. between mid and rear wheel	3,543			
FOURTH CAR. R. T.	Tension under rear wheel	5,905			
	Compression in rear of wheel	2,126			
	Comp. in center of space between trucks	0		54,942	
	Compression in front of truck wheel	1,653			
	Tension under front wheel	6,850			
	Comp. between front and middle wheel	6,141			
	Tension under middle wheel	3,543	30,942		
	Comp. between middle and rear wheel	4,724			
	Tension under rear wheel	5,905			
	Comp. bet. r. w. of 4th & f. wheel of 5th car	4,253			
FIFTH CAR. F. T.	Tension under front wheel of fifth car	7,795			
	Comp. between front and middle wheel	4,253			
	Tension under middle wheel	6,141	36,611		
	Comp. between middle and rear wheel	4,015			
	Tension under rear wheel	8,503			
	Compression in rear of wheel	3,778			
	Compression in center of space	0		78,111	
FIFTH CAR. R. T.	Compression in front of wheel	3,543			
	Tension under front wheel	11,574			
	Comp. between front and middle wheel	4,015			
	Tension under middle wheel	6,614	38,500		
	Comp. between middle and rear wheel	4,015			
	Tension under rear wheel	7,558			
	Comp. bet. r. w. of 5th and f. w. of 6th car.	2,362			
SIXTH CAR. F. T.	Tension under front wheel	7,322			
	Comp. between front and middle wheel	3,307			
	Tension under middle wheel	3,307	26,927		
	Comp. between midd and rear wheel	3,307			
	Tension under rear wheel	5,669			
SIXTH CAR. R. T.	Compression in rear wheel	2,834		71,985	
	Comp. in center of space between trucks	0			
	Comp. in front of wheel of r. truck..Shocks	3,543			
	Tension under f. wheel of r. truck of 6th car	7,086			
	Comp. between front and middle wheel	6,141			
	Tension under middle wheel	4,253	34,908		
	Comp. between middle and rear wheel	5,432			
	Tension under rear wheel	4,724			
	Compression in rear of wheel	3,307			
	Shocks	470			

Instrument returned to zero after passage of train.

Stremmatograph Record.—3.

New York Central & Hudson River Railroad; Empire State Express, train number 51, leaving Grand Central Station, New York, 8.30 a. m., July 21, 1898. Rail 6 in. deep, 100 lbs. per yard. Apparatus applied on outside rail, 3° curve above Forty-ninth street. Ties slightly tamped near stremmatograph.

Speed, miles per hour 19
Temperature ..... 110° F
Locomotive No. 870 and tender ..... Weight 202,000 lbs.
Combination baggage and smoker ..... Weight 95,000 "
Vestibule coach, No. 936 ..... Weight 86,200 "
Vestibule coach, No. 914 ..... Weight 82,000 "
Wagner car, No. 113 ..... Weight 94,950 "

The apparent mean extreme fiber stresses per square inch in 5 in. of the length of the base of the rail were as follows:

		Pounds.			
ENGINE. Truck.	Compression in front of truck wheel	2,598			
	Tension under front truck wheel	13,699			
	Comp. between front and rear truck wheel	4,488	58,741		
	Tension under rear truck wheel	8,267			
ENGINE. Drivers.	Comp. bet. rear truck wheel and front driver.	4,724			
	Tension under front driver	5,669			
	Comp. between front and rear driver	6,337		89,092	
	Tension under rear driver	4,488			
TENDER. F. T.	Comp. bet. rear driver and front tender wheel	6,141			
	Tension under front tender wheel	4,015			
	Compression between front truck wheels	3,779			
	Tension under rear tender wheel front truck.	3,071			
	Compression between front and rear truck	5,669			
TENDER. R. T.	Tension under front tender wheel rear truck.	5,669			
	Compression between front and rear wheels.	2,598			
	Tension under rear tender wheel	4,960			
	Comp. bet. rear tender wheel and car wheel	4,960			
FIRST CAR. F. T.	Tension under front car wheel	5,196			
	Compression between front and middle wheel	3,779			
	Tension under middle wheel	5,669			
	Comp. between middle and rear wheel	3,071			
	Tension under rear truck wheel	5,432			
	Compression in rear of wheel	2,126			
	Comp. in center of space bet. trucks..Shocks	2,598			
	Compression in front of first truck wheel	1,181			
FIRST CAR. R. T.	Tension under front wheel	12,754			
	Comp. between front and middle wheels	3,779			
	Tension under middle wheel	6,850			
	Comp. between middle and rear wheels	3,779			
	Tension under rear wheel	7,322			
	Comp. bet. trucks of first and second cars	1,417			
SECOND CAR. F. T.	Tension under front wheel of truck of 2d car.	8,739			
	Comp. between front and middle wheel	1,417			
	Tension under middle wheel	6,614			
	Comp. between middle and rear wheel	1,417			
	Tension under rear wheel	5,432			
SECOND CAR. R. T.	Compression in rear of wheel	708			
	Comp. in center of space bet. trucks..Shocks	2,598			
	Comp. in front of wheel of rear truck	2,362			
	Tension under front wheel	8,031			
	Comp. between front and middle wheel	3,779			
	Tension under middle wheel	4,253			
	Compression betwen middle and rear wheel	1,417			
	Tension under rear wheel	6,614			
	Comp. bet. r. t. of 2d car and f. t. of 3d car.	2,126			
THIRD CAR. F. T.	Tension under front wheel of third car	6,850			
	Comp. between front and middle wheel	2,126			
	Tension under middle wheel	6,141			
	Compression between middle and rear wheel.	2,126			
	Tension under rear wheel	4,960			
THIRD CAR. R. T.	Compression in rear of wheel	472			
	Comp. in center of space between trucks	472			
	Compression in front of wheel of rear truck.	2,126			
	Tension under front wheel of rear truck	10,393			
	Comp. between front and middle wheels	2,126			
	Tension under middle wheel	4,724			
	Compression between middle and rear wheels	2,126			
	Tension under rear wheel	6,377			
	Comp. bet. r. w. of 3d car & f. w. of 4th car	1,653			
FOURTH CAR. F. T.	Tension under front wheels of fourth car	8,267			
	Compression between front and middle wheel	1,653			
	Tension under middle wheel	7,086			
	Compression between middle and rear wheel.	1,653			
	Tension under rear wheel	8,739			
FOURTH CAR. R. T.	Compression in rear of wheel	945			
	Comp. in center of space between trucks	0			
	Compression in front of truck wheel	1,417			
	Tension under front wheel	8,739			
	Comp. between front and middle wheel	2,598			
	Tension under middle wheel	6,850			
	Compression between middle and rear wheel.	2,834			
	Tension under rear wheel	7,794			
	Compression in rear of wheel	2,126			

Instrument returned to zero after passage of train.

Stremmatograph Record.—4.

New York Central & Hudson River Railroad, Adirondack and Montreal Express, train No. 57, leaving Grand Central Station, New York, 8.33 a. m., July 21, 1898. Track conditions as in Record Number Three.

Speed, miles per hour 19
Temperature ..... 110° F
Locomotive, No. 898 and tender ..... Weight 202,000 lbs.

The apparent mean extreme fiber stresses per square inch in 5 in. of the length of the base of the rail were as follows:

		Pounds.			
ENGINE. Truck.	Compression in front of truck wheel	4,253			
	Tension under front truck wheel	9,684			
	Comp. between front and rear truck wheel	5,196			
	Tension under rear truck wheel	10,393	58,700		
ENGINE. Drivers.	Comp. bet. rear truck wheel and front driver	4,253			
	Tension under front driver	6,614			
	Compression between front and rear driver	2,362			
	Tension under rear driver	10,157		88,697	
	Comp. bet. rear driver and front tender wheel	2,598			
TENDER. F. T.	Tension under front tender wheel	7,086			
	Compression between front truck wheels	2,598			
	Tension under rear tender wheel front truck	6,141		29,997	
	Compression between front and rear truck	4,488			
TENDER. R. T.	Tension under front tender wheel rear truck	4,488			
	Compression between front and rear wheels	1,890			
	Tension under rear tender wheel	4,960			
	Comp. bet. rear tender wheel and car wheel	3,071	1,535		

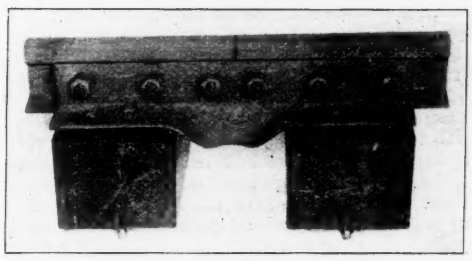
each truck is likely to give the greatest stress in taking up the looseness of the rail. The stresses under the trailing wheels of each truck will also be high for the same reason, but on either side of the leading or trailing wheels, in the base of the rails, large stresses of compression are developed, which help to carry the wheel loads.

While, of course, it is not desirable to have loose rails in the track, they cannot be wholly prevented in extreme hot weather, owing to the thermal stresses of compression set up in the rails by rising temperatures. Much greater stresses of compression can exist in the rails without danger of breaking the rails than is possible to have if stresses of tension set up in the rails by the falling temperatures before the rails render in the splice bars.

In the latter case the factor of safety is decreased as the tension is set up in the rails, which is so clearly shown by all rails breaking in the track in falling temperatures, unless it is the completion of a fracture of preceeding injury to the rail.

The Bonzano Rail Joint.

The engravings show a rail joint patented by Mr. A. Bonzano in 1897, which has had a good deal of experimental use, particularly in the tracks of the Pennsylvania Railroad. The line drawings are reproduced from a blue print from the office of the Engineer of Maintenance of Way of that railroad, and show a 30-in. splice, designed in September, 1897, for an 85-lb. rail. The half tone from a photograph shows



The Bonzano Rail Joint.

the actual splice on a 100-lb. rail on the Pennsylvania Railroad main line west of Harrisburg.

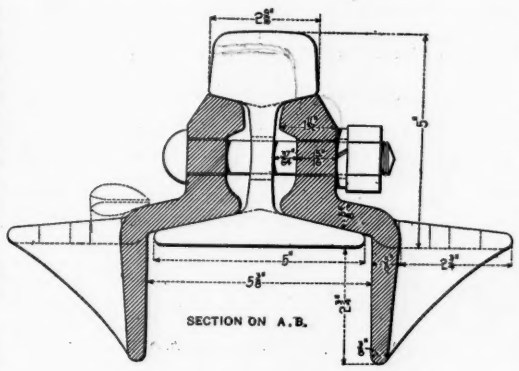
The engineer will see at once that the first controlling idea in this design is to get a sufficient depth to make a girder of approximately the same strength as the rail. With the increase in strength and size of rails the importance of increasing the vertical strength of the angle splice has become more and more apparent. Within a few weeks the writer of these lines stood on the rear platform of a train for more than 100 miles on the line of a great railroad. So far as ballast, drainage and ties go, the track was in fine condition; in fact, it was stone ballasted all the way. The rails had been in about ten years, and seemed to be still in pretty good condition, except that every joint was low, and the recurrent click of the joints was painful to anybody who had a proper appreciation of the punishment to which the rails and the rolling stock were being subjected by the blows administered every thirty feet. The road-master said that the whole trouble was that the rail section, which was rather low for a rail of that weight, did not permit a deep enough angle plate. Of course, this is only a typical case, and it might be repeated indefinitely, and various forms of joints with dependent flanges have been designed.

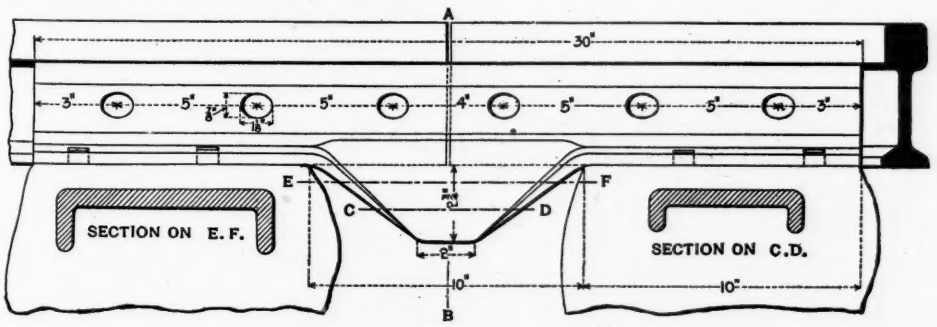
In Mr. Bonzano's joint that part of the plate which fits between the under side of the head of the rail and the top of the base of the rail is made in the usual manner. The lower part of the splice-plate projects about 3 in. outwardly beyond the edge of the rail and is on a level with the base of the rail, giving additional bearing on the tie and lateral stiffness to the rail. The middle part of this projecting flange is turned down to an angle of about 90° without any cutting. The horizontal flanges form the end-bearings of the top-member of the splice, and also the bearing for the gusset-shaped ties which connect the depending flange or lower member with the horizontal flanges, and the whole structure is an economical, strong and rigid truss.

This form of splice-plate not only gives much greater vertical stiffness and strength to the joint, but it also gives great lateral stability to the rails. It also gives more than 100 per cent. additional bearing upon the ties.

In Mr. Bonzano's patent specifications he speaks of the upper member or the angle splice proper as the upper chord of this truss bridge joint, and of the dependent flange as the lower chord, and the bent portion of the metal connecting the two he calls the web members. He prefers that the lower chord should depend vertically. The webs prevent this lower chord moving laterally and also help to keep the portion of the flange which spreads out on the ties from bending. "The inclined webs with the lower chord form a channel construction and they so tie the feet, lower chord and upper chord together that I am enabled to use much less material in the construction of the joint than heretofore used in joints of this type." He prefers to roll the plate with the outer member originally bent down to about 45° and then to stamp up the parts that are to rest on the ties and stamp down the middle or dependent part, but in actual practice the members are rolled at right angles and the dependent flange then pressed down.

This joint has been in constant use for some months in the main track of the Pennsylvania Railroad west of Harrisburg, and Mr. Bonzano refers by permission to Mr. Joseph T. Richards, Engineer Maintenance of Way, as to the merits of the joint. It can easily be made as stiff as the rail, while Pennsylvania Railroad experiments have shown that the ordinary angle joint has only from 28 to 32 per cent. of the strength of the rail.





The Bonzano Rail Joint on a Pennsylvania 85-lb. Rail.

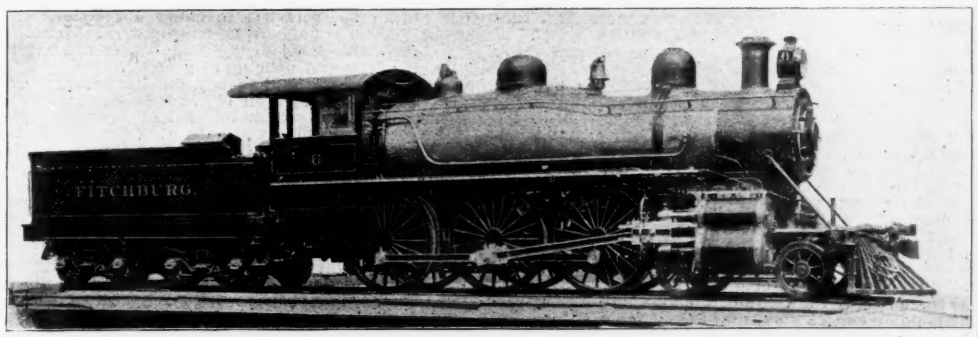
Anti-Creeping Device.

Besides the rail joint briefly described above, Mr. Bonzano has patented an anti-creeper, which is shown in two forms in the half tone from a photograph. It consists of a bar about 2¼ in. x ⅝ in., long enough to be spiked to two ties with one tie intervening. The middle of the bar is bolted to the web of the rail by one or two bolts, as preferred. The rail is anchored at or near the middle, and is free to expand and contract, but is held from creeping by the two ties to which the anti-creeper is spiked.

The bad results of the creeping of rails are so well known that any device that will effectually prevent creeping will be very welcome, provided its cost is not serious. The cost of the Bonzano anti-creeper is trifling compared with the work that it is designed to do.

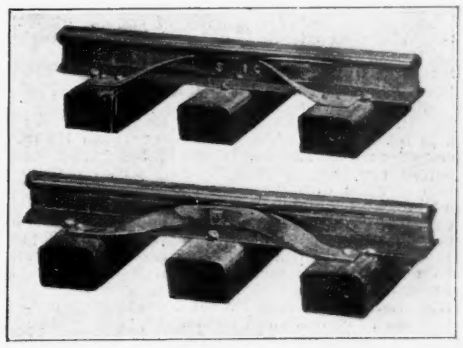
Ten-Wheel Passenger Locomotives for the Fitchburg.

The Fitchburg Railroad has recently received from the Baldwin Locomotive Works two 10-wheel passenger locomotives, which are identical in all respects excepting the cylinder arrangement, one of these being a Vauclain compound and the other a single expansion locomotive. What is rather remarkable is that the builders guarantee that each of the engines will haul a train of 325 tons up a 60-ft. grade 10 miles long, at a speed of 40 miles an hour.



Ten-Wheel Vauclain Compound Passenger Locomotive for the Fitchburg Railroad.

The engraving shows the appearance of the compound, which has cylinders 15 in. and 25 in. in diameter, by 26 in. stroke, and piston valves; the total weight is 150,000 lbs., with 111,000 lbs. on the driving wheels. The simple engine has cylinders 21 in. by 26 in. and balanced slide valves, while the total weight in working order is 147,500 lbs., of which 110,500 lbs. is on the driving wheels. The other principal dimensions are the same for both locomotives and are as follows:



Bonzano's Anti-Creeper.

General Dimensions.

Gage	4 ft. 8½ in.
Fuel	Bituminous coal
Wheel base, driving	14 ft. 6 in.
" " total engine	26 ft. 3 in.
" " " and tender	53 ft. 2 in.
Driving wheels, diameter outside	78 in.
" " journals	8½ in. x 12 in.
Engine truck wheels, diameter	36 in.
" " journals	5¼ in. x 10 in.
Boiler, diameter	60 in.
" thickness of sheets	⅝ and 11/16 in.
" working steam pressure	200 lbs. per sq. in.
Firebox, material	Steel
" length	120⅝ in.
" width	41¼ in.
" depth	Front 76⅛ in. / Back 61 11/16 in.
Thickness of sheets: Sides, ⅝ in.; back, ⅝ in.; crown, ½ in.; tube, ½ in.	
Tubes, number	328
" diameter	2 in.
" length	15 ft. 1 in.
Heating surface, firebox	172.37 sq. ft.
" " tubes	2,576.1 sq. ft.
" " total	2,748.47 sq. ft.
Grate area	34.48 sq. ft.
Diameter of wheels	36 in.
Journals	5 in. x 9 in.
Tank capacity	4,500 gals.

Car Truck Construction.

At the September meeting of the Northwest Railway Club, Mr. J. C. Barber, now with the Standard Car Truck Company, Chicago, and formerly Master Car Builder of the Northern Pacific, presented a paper, "Car Truck Construction and Repairs." Mr. Barber is an advocate of the diamond frame or arch bar type of car truck, and the following extracts are taken from his paper:

If one carefully reviews the various designs of trucks and bolsters that have been placed on the market, and many of those that have been in service for the past seven years, he will be convinced that their record has not only been poor, but many of the designs are pronounced failures, owing to certain conditions which we find are more severe on trucks of to-day, as compared with the service of from eight to ten years ago. These conditions referred to embody the increased capacity of cars, increased speed of trains, the employment of power brakes, vertical plane or M. C. B. couplers, heavier and more powerful springs, and the past tendency to use trucks of rigid construction. Entering into detail as to the effect on rigid trucks designed to meet the above service we find the increased capacity or load on rigid trucks multiplies the forces on all parts, and especially the friction of the wheel flange against the rail and on center plates and side bearings, and unless those conditions are provided for and relieved mechanically the truck frames and all vital wearing parts

become overburdened, defective and are sent to the repair track. The increased speed of trains has also necessarily more than doubled the force of vibrations and blows on truck frames, wheels, axles, etc., and this, together with the employment of springs of greater power with increased action, which in turn increases the vertical movement of the pedestal against the journal boxes, the column guides against the columns and the bolster friction plates against each other, the whole producing wear and tear with their combined forces and each adding their injurious factors that shorten the life of trucks. Power brakes, which have become a necessity, furnish another destructive element to many designs of trucks; in some cases the cause is due to their being improperly attached.

The arch bar form of truck has been unjustly and ungenerously criticised. Perhaps, however, through ignorance or from personal motives, but with all the crushing influences brought to bear by certain truck manufacturers, strengthened by letters and public statements issued from the heads of certain railroads, the improved diamond frame or arch bar truck still exists and is being used with satisfactory and economical results. When properly constructed in detail it is not found wanting in service, first cost and cost of maintenance; neither is the material it embodies objectionable to manufacturers when building, or to railroad companies when repairing. It has come to stay for use in equipping cars of the present popular capacity of from 50,000 to 80,000 lbs., and in proof of this statement, if I am correctly informed, the modern diamond frame trucks, better known as the arch bar trucks, of the above capacity are regularly used on 80 per cent. of the railroads in the United States. The heads of the mechanical departments of these roads, however, have nearly all made more or less radical changes in way of improvement in the detail of construction in the diamond frame design. In fact, the detail of many parts has been changed or abandoned, especially for cars of 60,000 pounds capacity and over, and the result is reported as more satisfactory than formerly; but one inspecting closely many of these changes sees room for further improvement. Some of the more salient features are as follows, and are worthy of consideration:

1st. For convenience employ both bottom and top arch bar of uniform dimensions.

2d. The size of arch bar to be such as to provide a proper factor of safety to carry the capacity of car in ordinary service.

3d. In forming the angle for arch bars have the bends made on a radius of not more than 1½ in. instead of a radius ranging from 2 in. to 5 in., as done in common practice, and the bending point to form the angle to start directly from the foundation of journal boxes and columns, instead of from 1 in. to 2½ in. away. Unless this practice is followed the arch bars when overburdened will straighten to a line from one foundation to the other, causing a sag in the frames, which increases the shearing force on bolts and fastenings.

4th. Ream all bolt and rivet holes in arch bars and tie straps to fit bolts and rivets.

5th. The wearing surfaces to support bolts through the top and bottom end of truck columns and journal box thimbles to have vertical bearings reamed to size, not less than the thickness of arch bars, and abandon the common practice of applying the castings with holes roughly cored, which allows shifting of the columns and the truck frames to get out of line.

6th. Apply journal box bolts of sufficient dimensions to resist buffing and shearing forces, and abandon the expensive cost of forging incident to turning up of the ends of arch bars.

7th. Attach brakes to truck frames where they will not be disturbed by forces radiating from the action of the bolster and springs, and eliminate the downward or vertical pull on the body bolster caused by the application of the brakes when attached to the car body, and avoid increasing the load on that already over-burdened member, and also diminish the destructive elements on brake rigging due to swaying of the car body.

8th. Employ solid construction sufficient to hold side frames and journal boxes from being forced out of line when rounding curves and the usual switching derailments. The desired flexible or lateral action to be embodied only in the bolster, which should be designed to act independent of the truck frames and exhaust gently or cushion the lateral forces, blows and shocks, thereby doubling the life and efficiency of the truck.

The practice of employing a short bolster not supported directly on the side frames at each end, but instead suspended from the channels or wood transoms on links or hangers, is questioned as being the best construction for present service, as the beam or bolster has no support to resist longitudinal buffing shocks except that of the transoms, which in turn are only supported by being riveted at their ends to the columns, but not sufficient to resist these buffing forces. It will be seen that the short bolster becomes practically a sledge, and the king bolt passing through it the sledge handle, and the buffing forces of the car body provide the power that wields the sledge which batters off the transom channels from the columns, with all their vital supports and attachments, which defect is erroneously laid to the force of power brakes. Again, the short bolster and transom design of truck admits only of suspending the load from the transom, which with age and wear deflects downward or sags and gives an inward tilting tendency to the arch bars or side frames, resulting in transferring a greater load on the back ends of the journal bearings. Investigation of construction on these lines will result in finding this to be the cause of a large per cent. of the hot boxes, instead of the numerous other theories offered.

If the short bolster beam in the rigid or swing truck is to be discarded, I would say employ instead a bolster designed to rest on the center line of the side truck frames, and supported between columns at each end, and in no case allow the bolster to bear against or rest on the transoms or cross tie bars. The springs supporting the outer ends of the bolsters should also rest on the center line of the side frames, and the design to be such as would not produce an unequal distribution of the load on the journal bearings or springs on account of deflection of the bolster or transoms.

A good dust-proof journal box lid and dust-guard form cheap and desirable additions to construction that prevent hot boxes; a good dust-proof lid, in my mind, is more essential than the dust-guard, as all dust lodging in the front end of box is forced under the journal by the packing spoon in the hands of the oiler. It is the common practice to load journal bearings from 400 to 550 lbs. to the square inch, and if construction is such as to force or tilt the side frames inward to the extent that the calculated load per square inch on bearings is supported on one-half of the brass it necessarily doubles the calculated load, which makes a proposition for a hot box that the ordinary train crew cannot cure, as oil ceases to flow between the bearing and revolving journal at a load of practically between 800 and 900 lbs. to the square inch. It will be seen, if we can eliminate this large per cent. of the hot box trouble by having trucks properly constructed, there will be but a small per cent. of defects left to cause hot boxes, which could probably be laid to improper composition of bearings, defective journals and box lids, neglect in care in oiling and poor quality of oil.

There has been a tendency all along for railroad people to adhere to their old standard form and size of center plates, which never had bearing surface sufficient to support even cars of 40,000 capacity. In proof of this fact you will often find cars on your repair tracks with the base or flanges of the center plate cracked or settled into the wood to various depths. Truck manufacturers have been compelled to employ these center plates which were standard to the road that have not only proved defective, but have added another factor which weakened other parts on account of the base not only being too small to carry a load of the marked capacity of the car, but prevented solid construction. Those that are increasing the capacity of their trucks should by all means increase the strength and bearing surface of their center plates proportionately.

As regards side bearings, if you are to employ a weak bolster in the truck or car body that readily deflects under loads of the marked capacity, then employ yielding or anti-friction side bearings, preferably the latter; but if your bolsters are of proper capacity to carry the load without deflection, then the demand is lessened for anti-friction bearings and the employment of the ordinary side bearings will be quite satisfactory.

It has been the practice to apply wooden or metal shims under the side bearings and center plates when adjusting the height of cars. To apply this shim we remove and replace, as a rule, eight bolts per car from center plates and eight or more bolts from a set of side bearings. This temporary makeshift is soon destroyed by being crushed, split and worn away. Modern construction admits of the center plates and side bearings being permanently secured, preferably riveted; and an adjustment of height has been introduced with a reduction of cost of maintenance of over 45 per cent.

It is a fact that metal trucks, or at least a large per cent. of construction, are gradually superseding the various wood and gray iron forms of trucks. As we look about us deciding on what metal to employ that will be economical in first cost and cost of renewals and repairs, we find the prices of the metals that we could possibly employ in trucks are as follows: Commercial rolled steel shapes, such as I beams, channels, plates and angles, 1⅛c.; gray iron, or common cast iron, 1½c.; malleable iron, 2¾c.; pressed steel, from 3c. to 4c.; cast steel, from 3½c. to 4½c. It will be seen that commercial steel shapes are not only the strongest, lightest and most convenient to procure, but show for themselves a saving in first cost over other metals quoted; and from careful observation and personal investigation made from time to time during the past three years I am convinced that commercial rolled steel shapes, combined with good malleable iron, produce a truck, if designed on modern lines, with greater efficiency and units of strength over many other metal trucks. In proof of this I have reports from a large number of trucks made of the above material that have been operated almost continuously for the past four months under loads of 70,000 lbs. at an expense of less than 1½c. per car per month. This statement does not include the cost of lubricating.

American Railway Association.

The fall meeting of the American Railway Association was held at the Holland House, New York City, last week, the sessions continuing through two days, Wednesday and Thursday. The report of the Committee on the Metric System was given in the Railroad Gazette last week. The greater part of the time of the convention was taken up with the discussion on the report of the Committee on Train Rules, which embraced an entire revision of the rules of the Standard Code for single track railroads. The work of the committee was very generally approved, but a number of amendments were proposed, and these were referred to the committee, to be reported upon at the next meeting, so that no final action was taken on the code. The Committee on Car Service presented a report favoring the adoption of a per diem rate in settling for interchanged freight cars, and there was some discussion on the report, but the subject was not reached until late in the afternoon of the second day, and action was therefore postponed. The Joint Committee on Interlocking and Block Signals reported that the revision of the definitions, requisites and rules for block signal systems was nearing completion, but the committee had been engaged on the train rules and therefore could not finish its work.

The Committee on Safety Appliances reported the number of freight cars in service now equipped with standard automatic couplers and air brakes. The figures show the condition on July 1 and differ somewhat from those made by the Interstate Commerce Commission for June 1. (Railroad Gazette, Sept. 23, p. 694.) The number of cars reported by the Commission as in service is about 40,000 larger, but the number equipped with air brakes is smaller. The present report shows:

Roads reporting	191
Freight cars in service	1,113,745
Fitted with automatic couplers	784,506
Percentage	70.4
Fitted with air brakes	523,143
Percentage	46.9
Engines in service	32,471
Fitted with power brakes	30,214
Percentage	93.0

The number of freight cars under contract or construction on July 1 was 33,088, and of engines 302, all to be fitted with power brakes and automatic couplers. An interesting feature of the report, throwing light on the increase in the activity of business during the last two years, is the following comparison of the last two items:

	New cars being built.	New engines being built.
July 1, 1898	33,088	302
Jan. 1, 1898	14,717	217
July 1, 1897	6,169	179
Jan. 1, 1897	3,221	78

The Association adopted an amendment to the rules of order prohibiting voting by proxy; and a committee was appointed on the revision of the rules of order, to report at the next meeting.

The date agreed upon for the general change of time-tables is Nov. 13. The Pennsylvania, the Baltimore & Ohio and the Southern were re-elected members of the Car Service Committee; the Chesapeake & Ohio, the Pennsylvania and the Delaware & Hudson were re-elected members of the Safety Appliance Committee. Over 100 railroad officers were present, representing 95 roads. Companies operating over 1,000 miles of road have joined the Association since the last meeting, and the membership now companies, operating about 163,000 miles.

The Consolidation of the M. C. B. and M. M. Associations.

The question of the consolidation of the Master Mechanics' and Master Car Builders' Associations was discussed at the last meeting of the Northwest Railway Club, and while there was not as general an expression of opinion as might be desired, still some points were brought out and pretty clearly answered. Especially is it to be noted that even the opponents of consolidation concede that such action on the part of the associations is bound to come sooner or later.

Mr. J. H. Goodyear, Chief Clerk in the Motive Power Department of the Chicago Great Western, who is not in favor of the consolidation, opened the discussion. He has found that the membership of the M. C. B. Association in 1897 was made up as follows: Thirty per cent. of the cars were represented by Master Car Builders; 5 per cent. by Assistant Superintendents of Motive Power, a title which he considers equivalent to that of Master Car Builder; 1 per cent. by General Superintendents; 20 per cent. by Superintendents of Motive Power or Master Mechanics of roads having Master Car Builders or General Foremen of the car department; 24 per cent. by men representing roads too small to possess a separate head to the car department, and 20 per cent. of the cars were represented by 10 Mechanical Superintendents. The argument presented is that these general officers are not representative car men, and are more interested in general mechanical subjects than in the discussion of car details and car interchange, and should the two associations be combined, the Master Car Builder would soon be lost sight of. The idea is advanced that the M. C. B. Association at present is not sufficiently representative of the car department proper, and that the Master Car Builders and General Foremen should attend the conventions and represent the large roads in place of the heads of the mechanical departments. It was also predicted that unless some action was soon taken, the control of the engine, round house and car men would soon be in the hands of the transportation department.

Mr. Tracy Lyon, Master Mechanic of the Chicago Great Western, answered very clearly the objections raised. He said in part:

I will take issue with the statement that 41 per cent. of the Master Car Builders' Association are locomotive men. The term "locomotive men" is entirely a misnomer. Those called locomotive men take as much interest in and have as much responsibility for the cars as they have for the locomotives; simply because they are Superintendents of Motive Power, Mechanical Superintendents or General Master Mechanics does not make them locomotive men pure and simple. They are responsible to their managers just as much for the cars and for the painting of the cars as they are for the locomotives and their operation.

The consolidation of the Master Mechanics' and Master Car Builders' Associations would seem to be in the direction of centralization and a decrease in the friction of business, and, therefore, it is bound to come. It seems to me that the objections offered to the consolidation of these two associations are more in the form than the substance. Certainly no one has a right to belittle the work done by the Master Car Builders' Association, and I certainly do not wish to do so. It has fulfilled a most valuable function. At the same time it is certainly open to question whether this same amount of work cannot be done in not only a more expeditious manner, but in a better way for the health of the railroads as a whole.

I would call the attention of those who have spoken in disfavor of the consolidation to the fact that the present M. C. B. code of rules governing the interchange of cars as they stand to-day, and their development in the last two years, are almost entirely the results of the efforts of the so-called "locomotive men." The principle of the present code of rules, throwing upon the owners of the cars the responsibility for their running repairs, originated a few

years ago with half a dozen such men. We called it first the "Chicago agreement," and operated under this agreement for a year as a matter of trial. The first year that such a change was proposed to the Master Car Builders' Association it failed to carry. The second year it carried after considerable hard work on the part of those who were interested in it. Therefore, it would certainly seem that the so-called locomotive men are not without interest in the principal work of the Car Builders' Association. The interests of the two associations are so closely allied and interwoven that it seems a waste of power to separate them. So far as the representation of the Master Car Builders themselves in a general association representing the rolling stock of the United States and Canada is concerned, there is no reason whatever why the Master Car Builders should not be represented as well as the Superintendents of Motive Power and Master Mechanics, and should not have every opportunity for expressing themselves and taking an active part in the proceedings and deliberations. At the same time I think that there are few Mechanical Superintendents who would be willing to intrust to another, even to their own assistants, in fact, the deciding vote in matters pertaining to the interchange of cars, or any other important question concerning the handling of cars, inasmuch as they are the ones who are directly responsible for the result.

At the same time if the Master Car Builder or General Car Foreman, or whoever represents the car department of a railroad, were to attend these conventions with the head of the mechanical department, the latter would have the advantage of his advice, and the Master Car Builder would have every opportunity, as I have said, to take part in the discussions.

The subject of the interchange of cars should not be considered as an art in itself. To those who are specially interested in it the inspection of cars is almost too likely to be considered as a fine art, while as a matter of fact it is merely a means to an end. We have been trying for several years to simplify the inspection of cars and to reduce the labor involved in it to a minimum, and this special agreement of which I have spoken, and the radical changes in the present code of rules brought about by "locomotive men," have been in that direction. Mr. Goodyear speaks of the probability that with the consolidated organization the Association would not be likely to recognize the Master Car Builders as individuals. I would remind him that at the last convention of the Master Mechanics' Association one of the Master Car Builders was made a vice-president of that Association, and certainly there is less reason why a car builder should be made an officer of a mechanical association than he should be made an officer of an association representing the rolling stock as a whole.

Mr. Goodyear says that unless active steps are taken, in a few years the absolute control of engine, roundhouse and car men will be in the hands of train superintendents. That is something I should be rather glad to see. A railroad is not operated for the privilege of inspecting cars or operating roundhouses. The purpose of a railroad is to move freight and passengers. The other things are simply the tools to this end, and they should be handled as such. I believe that before very long the strictly operating part of a railroad, including the control of engine, roundhouse and car men, will be more entirely in the hands of the superintendent, and that the function of the mechanical man will be more in the way of a consulting engineer. As it is now, he is retained practically by the railroad as an expert, yet he has, as such, too much to do with the actual traffic of the railroad. He might accomplish more if he had more leisure to consider quietly the larger problems of the improvement in cars, motive power, fuel handling and consumption, machinery and everything that pertains to the maintenance and operation in itself of the rolling stock and the shops.

The Completion of the Boston Subway and New Arrangements of Street Cars.

The plans of the northern portion of the subway, recently opened to traffic, have had to be altered to some extent on account of the new developments in connection with the Boston Elevated Railway. As related in a former article (July 2, 1897, p. 473) the plan now is to have no surface cars run the entire length of the subway at all, the central two-track portion and the outer tracks of the four-track portions being devoted exclusively to the elevated cars. The underground loop at Causeway street and the foot passage under that street to the Union station have therefore been abandoned, as this plan was made necessary only by surface cars from the south whose route ended here. The incline to the surface begins about 265 ft. north of the Haymarket square station, and all four tracks rise uniformly by a 4.6 per cent. grade to the surface. From here the exterior tracks will continue by the same grade to the level of the elevated structure, which is reached about 200 ft. south of Causeway street. The total length of the incline from the subway to the elevated when the elevated portion is built will be about 700 ft., and the distance from the surface to the portal of the subway about 286 ft. In lieu of the subway connection under Causeway street there will be an elevated connection over the street between the Causeway street station of the elevated road and the Union station.

The station buildings at Scollay, Adams and Haymarket squares are quite unlike those on the Common (for which see Railroad Gazette, Nov. 26, 1897, p. 833), and present individual points of interest. The first two were designed by Charles Brigham and consist of a central square tower and two wings. They are built of Milford granite, except that the wings from 6½ ft. above the sidewalk consist of an ornamental cast iron frame, with glazed panels and bronze and copper trimmings. The cast iron is painted to represent old bronze green. The roofs of the wings are glazed with ribbed glass; the window casings, doors and the ceiling of the central tower are of quartered oak, and the door and roof frames and window grills are of bronze. The foundations rest on the girders and beams forming the roof of the subway, and at the street level there is a cast iron base. Above this base, over the stairways, the wall is lined internally with enameled brick, and below with black streaked marble, giving a very handsome appearance. The tower of each station contains a clock with four dials set in dormers, and is roofed with fluted copper tiling. Particular pains has been taken to make the joint at the base absolutely waterproof by a covering of asphalt. The building is surrounded by a curb and sidewalk platform of varying grade and width, and the floor inside is one step above this on the easterly side, the westerly side being about even with the sidewalk. The floor has a slight pitch outward to prevent entrance of water. The stairs are provided throughout with the Mason Safety tread. The Adams square station has sidewalk lights, but these were not needed to secure sufficient light at Scollay square. Scollay square station (or stairway covering) is 17 ft. x 51 ft. in plan, with semi-circular ends; that at Adams square is 15 ft. x 49 ft., with square

Scollay Square Station of the Boston Subway.

ends. They are 12½ ft. high to the cornice of the wings and 43 ft. high to the top of the tower. There is also at Scollay square a small cover, 10½ ft. x 35 ft., to an exit stairway north of the main building, and built on the same model, without tower.

The contractors for construction of these station coverings were Woodbury & Leighton. The Hecla Iron Works furnished the bronze, Brown Ketcham Iron Works the ornamental iron, E. B. Badger & Sons the ornamental copper and Bowker, Torrey & Co. the marble work. The clocks were furnished by Geo. M. Stevens, of Boston.

In the Scollay square building the entrances are at the southern and the staircase under the northern end; at Adams square the entrances are in the center, on each side, and there are two staircases, one under each wing of the building. Each staircase is divided longitudinally by a rail into entrance and exit. The entrance side is intercepted by a faretaker's booth, which is at the foot of the staircase at Scollay square, but at the head at Adams square; while the exits are barred at the lower end by turnstiles which allow passage only one way.

The cost of these station coverings—two at Scollay square and one at Adams square—was about $50,000.

The Haymarket square station building is less pretentious, and was the only one designed by the Transit Commission. It was built with reference to utility, with little attempt to follow architectural rules. It is 13 ft. high to the wall plate and 21 ft. high to the top of the roof, and 32 ft. x 34 ft. in plan. It is in the shape of a square, with two opposite corners rounded.

The roof is supported on a steel frame, and there is a skylight in the center. It is (except the skylight) of white oak planks polished inside and covered with copper outside, and overhangs the sidewalk 5½ ft. The floor is all concrete and continuous with the sidewalk. The staircasings and trimmings are white marble, like the walls. There is a sidewalk light over each stairway. The building is designed, like the others, to admit a maximum of light to the platforms below.

At all the stations except at Haymarket square, either the turnstiles or ticket offices, or both, are located on the platforms below. The Scollay square platform, shown in the drawing, is typical. This has a triangular form, as at this point the north and south bound tracks separate, going through Cornhill and Hanover street respectively. The track on the lower (east) side of the diagram is the loop track for cars from and to the north. This track, besides the central platform, may be reached by a side platform leading from an entrance at the corner of Brattle street and Scollay square.

The stairways in the center of the platform are shown on a larger scale in the upper part of the cut.

In the diagram of the stairways at Brattle street the space indicated by the letter L has landings at two levels. Passengers going out of the subway pass from H up stairs to K and thence to Brattle street, K being on a level with the street. Passengers going into the subway enter the stairway from Scollay square (at the word "down" on the diagram) and at L pass under the landing of the exit stairway, and thence down the short flight of steps to the ticket offices, T, in the subway.

The aspect of the interior of the subway is commodious and cheerful. It is so well lighted and ventilated as to dissipate the fears which had been felt of danger to health on account of dampness or chilliness. The walls in the vicinity of the stations are lined with white enameled brick, and the walls elsewhere and the roof everywhere are painted white or whitewashed. The steel columns are encased in concrete and also painted white. The lighting throughout is brilliant; at the stations arc lamps are used (mostly of the inclosed type) and elsewhere incandescent lamps, arranged five in series on the regular railroad circuit. The latter are run in lines 36 ft. apart on either side of the subway and between the tracks, and the circuits are alternated so that trouble in one lamp would not cause those in the immediate vicinity to be extinguished; and a portion of them may in an emergency be connected to the Boston Electric Light Company's circuit. A portion of the station arc lamps are regularly run by the latter company, so that in no emergency can the subway be left in darkness. The lighting of the entire subway is controlled from a large room under the junction of Tremont and Boylston streets, containing a switchboard with circuit-breakers, ammeters, switches, etc. In ordinary daylight few lamps are needed at the stations.

The rails used are A. S. C. E. standard 85-lb T, and each rail is protected for its entire length by a rolled steel guard of special section, 43 lbs. to the yard, bolted to it. Ties are of oak and chestnut, treated with woodiline to exclude moisture and increase the insulation of the track. They are laid in broken stone ballast. There are tie-plates on each tie and the rail joints are of the "Continuous" pattern. Each rail joint is bonded with two 0000 copper bonds, and at intervals of 500 ft. all the tracks are bonded together and cross connected, the station return being by 500,000 c. m. cables. The trolley wire is the special "figure-8" 362,000 c. m. section found so successful on the first portion of the work, suspended under a wooden trough by hangers 12 ft. apart on straight track and 6 ft. on curves. The conductor thus formed is perfectly smooth, rigid and level, and has been found to eliminate arcing almost entirely. The current is drawn from feeders laid in a conduit of "National" cement-lined duct laid in concrete in one of the lower corners of the subway.

The switches and frogs are of special design, and the former are arranged to be thrown by levers, which are fastened in place by steel wedges. A special feature is a small switch tower near Traverse street at the entrance to the subway, which mechanically controls four levers used for switching cars between the inside and outside tracks of the subway.

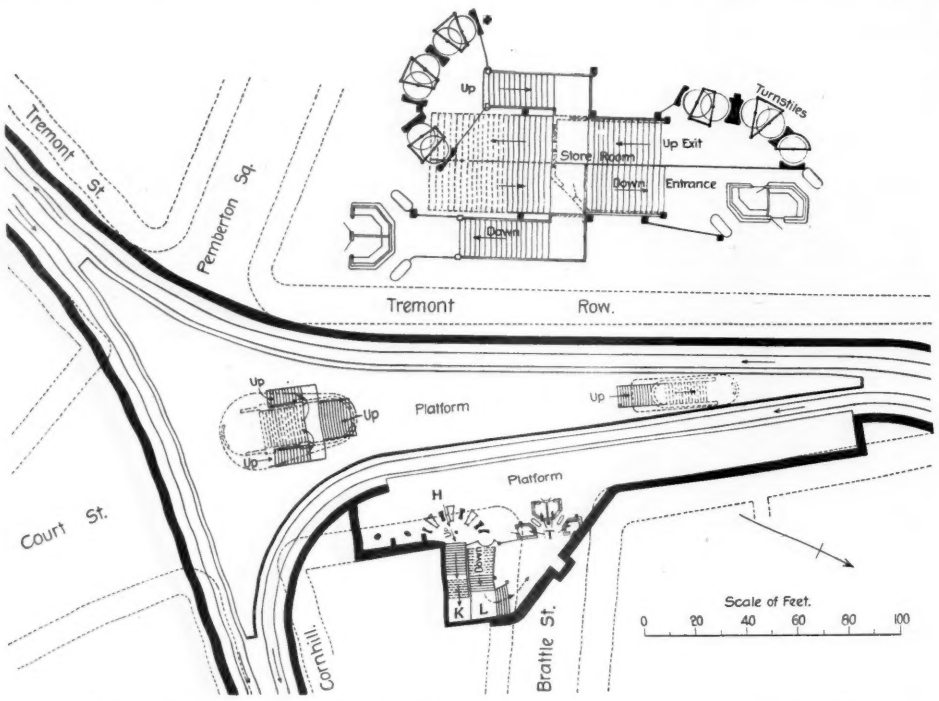
Throughout the subway there are 3-in. wrought-iron water pipes for protection against fire, with frequent connection to the city mains, and equipped at frequent intervals with valves, fire hose and nozzles. The ticket offices at the stations are heated by electric heaters.

The structure of the subway, as already described in these columns, is for the greater part of its length a rectangular steel frame, but on Tremont street north of Park and south of Boylston streets it is a single or double-barreled brick and concrete arch. There are no grade crossings, these being avoided in each case by a sub-passage for one of the crossing tracks.

Although it is not expected to run surface cars through the length of the subway after completion of the elevated structure, for the present all lines possible have been put into it, a number of changes in routes and tracks having been made for that purpose. The ferry lines, having no convenient exit from the subway at the northern end, have been changed to run on Washington street, together with

all the other lines (making a total of seven) now running on Tremont street which could not be accommodated in the subway, so as to leave the tracks on Tremont and Boylston streets between Scollay and Park squares free to be removed, as provided by the original Subway Act. The removal of these tracks began Oct. 1. On the other hand, to prevent overcrowding Washington street, two lines on that street will be changed so as to run in the subway. All cars entering the city through Charlestown and turning at Scollay square, and all Lynn & Boston cars, will also use the subway.

In connection with the recent opening of the last section of the subway, the important decision was made by the Boston Elevated Railway Company to extend at once free transfers, although the law does not require this until the first section of the elevated road is completed. Under present arrangements one may traverse the system between its extreme northern and southern limits for a single fare of five cents, although between eastern and western limits the opportunities are yet somewhat restricted. Thus from Medford, Malden, Everett or Somerville one may ride to Forest Hills, Dorchester, Jamaica Plain, Brookline, Brighton, Newton, Watertown or Arlington Heights for five cents. Cambridge, hitherto without direct communication with the Union station except by way of East Cambridge, has now not only transit for one fare, but quick and reliable transit. The main transfer station is in the subway, at Park street. Here south-bound cars first make a stop at the transfer platform for passengers wishing to change to some other line, and then a second stop to receive new passengers at the regular stopping place. All cars



Platform at Scollay Square Station, Showing Arrangement of Ticket Offices and Turnstiles.

from and to the west via Boylston street use the inner pair of tracks and turn at the Park street loop; whereas all cars via the Pleasant street entrance use the outer pair of tracks and run straight through the subway. The inner and outer pair of tracks in the Tremont street four-track subway are thus kept entirely separate, and delays and possible accidents from switching are avoided. A secondary transfer station is established at Sullivan square, Charlestown (the terminal selected for the elevated road), where lines from northern points converge.

The actual running time, which has been carefully measured for a large number of cars, and made the schedule time, in pssing through the subway between the north and either south portal, is about 9 minutes, occasionally rising to 10 minutes—a rate of about 8.5 miles per hour, as compared with 10 to 27 minutes, averaging 17 minutes, or 4.8 miles per hour, for the same distance on the surface. The number of cars in each direction per day is at present about 2,800, and during the maximum hour about 250. The handling of cars and switches has been accomplished from the beginning without the slightest difficulty or interruption.

The entire length of the subway is approximately 1.8 miles, containing 28,000 ft., or 5.3 miles of track. The exact total cost cannot be told until certain land values have been fixed, but it will be decidedly less, both for construction and real estate, than the engineer's estimate, which was about $4,000,000 for construction, and $1,000,000 for land. The state appropriation was $7,000,000. Ground was broken March 28, 1895, and the whole structure was thrown open to traffic Sept. 3, 1898; the time occupied in building being 3 years 5½ months.

The members of the Boston Transit Commission are George G. Crocker, Chairman; Charles H. Dalton, Thomas J. Gargan, George F. Swain and Horace G. Allen; Secretary, B. Leighton Beal; Chief Engineer, Howard A. Carson. Mr. Allen was appointed in November, 1896, to fill the place of Mr. A. C. Burrage, resigned. Chief Engineer Carson has had entire charge of the engineering from its inception, including the preliminary plans and estimates. Of the station coverings those on the Common were designed by Wheelwright & Haven, and those at Scollay and Adams squares, as above stated, by Charles Brigham. The interior equipment and fittings, including track, lighting, ventilating, ticket offices, turnstiles, etc., have been furnished by the Boston Elevated (formerly West End Street) Railway Company. The subway construction was let in sections to a large number of contractors, except the tunneled portion on Tremont street (see Railroad Gazette, Feb. 12, 1897), which was built by the Commission directly. We judge the people of Boston, as a whole, are well satisfied, both with their subway and the way in which the work has been done by the Commission.

Although the portion of the subway proposed to be constructed is now complete, and the Charlestown bridge practically so, there yet remains as work for the Boston Transit Commission the East Boston Tunnel, which, under the Rapid Transit Act of 1897, the Commission was required to construct; besides the Cambridge street branch of the subway, required by the same act to be constructed on request of the railway company, which request has not yet been made; and other projected additions. As, however, the term of the Commission expires in nine months (July 2, 1899), and as the amount of the state appropriation remaining unspent may not suffice for the above projects, some further action by the Legislature may be looked for as the next important step. Nevertheless the Commission is proceeding with plans for the East Boston tunnel. At present nearly a dozen different routes are under consideration. It is possible some legal obstacle may also be encountered, but the Commission is proceeding with the work, as required by the act.

Pullman Palace Car Company.

At the annual meeting of this company, in Chicago, Oct. 13, the old Board of Directors was re-elected. The stockholders voted to issue $18,000,000 of new stock to capitalize the existing surplus. This will be distributed to stockholders of record Nov. 1, making a stock dividend of 50 per cent., each holder receiving one share of new stock for each two shares now held by him. Robert T. Lincoln is Chairman of the Executive Committee and Acting President.

The annual report for the year ending July 31 shows the following statistics of traffic, earnings and capital:

Earnings of cars	$8,598,837	
" " patents	12,138	
" from manufacturing, etc.	2,063,893	
		$10,674,868
Operating expenses	$3,776,315	
Paid other interests in lines partly owned	831,634	
Repairs in excess of mileage	793,036	
Dividends	2,880,000	
		$8,280,985
Surplus		$2,393,883

Assets.

Cars and equipments	$22,153,304
Investments in other car ass'ns	2,896,468
Plant at Pullman	8,113,767
Other shops and real estate, etc.	1,577 295
Lumber, supplies, etc., inc. cars unfinished	4,099.948
Patents	114,609
Furniture	75,000
Securities, loans, cash, cash items, etc.	24,056,714
	$63,083,105

Liabilities.

Capital stock	$36,000,000	
Special dividend Aug. 15	7,200,000	
		$43,200,000
Surplus		19,883,105
		$63,083,105

The surplus invested in the assets of the company is $29,896,842; but from this deductions are made aggregating $10,013,737, reducing the net surplus to the sum stated above. The deductions include depreciation of cars and other property, $1,577,666; settlement with Central Transportation Co., $1,195,930; franchises, patents, etc., $1,190,760; special dividend, $7,200,000. These written-off items are partly offset by an item of $1,150,619 appreciation in value of securities.

Following are comparisons with the two preceding years:

	1898.	1897.	1896.
Car earnings	$8,598,838	$7,743,344	$8,162,460
Other income	2,076,030	1,231,544	1,081,923
Total	$10,674,868	$8,974,888	$9,244,383
Operating expenses	3,776,314	3,511,868	3,730,079
Other ass'ns	831,634	812,169	847,898
Other expenses	793,036	.....	138,998
Dividends	2,880,000	2,880,000	2,880,000
Total	$8,280,984	$7,204,037	$7,596,975
Surplus	2,393,884	1,770,851	1,647,408

From the statement made by Acting President Robert T. Lincoln at the annual meeting the following additional statistics are gathered:

Cars built for the company during year	23
Cost of same (av. $15,989 each)	$367,739
Passengers carried	5,356,912
" " previous year	4,852,398
Car miles	201,295,321
" " previous year	190,652,758
Cars owned and controlled, first class	2,039
" " " second class	371
Mileage of roads	121,662
(a) Product of car works, value	$10,368,256
(b) Product of other industries, including rentals	1,032,087
Total a and b	$11,400,343
" previous year	4,681,618
Average number on pay roll at Pullman	5,012
Average pay per capita	$539
Average pay of journeyman mechanics at Pullman per day	$2.39
Same, previous year	$2.28
Deposits in Pullman Savings Bank	$679,332
Increase from previous year	175,893

If the cars run during the past year had made the 201,295,321 miles in trips of 375 miles each the number of trips would have been 536,787, and the 5,356,912 passengers would have averaged just about 10 to each car for each trip.

Riveted or Pin Connected Bridges.

In the Polytechnic of Oct. 8, Mr. C. F. Stowell reviews, in some spirited notes, the classical fight between pin-connections and rivets. The old reader will find his remarks entertaining for old-time's sake; the young reader will enjoy such a lively introduction into this field of discussion.

I long ago became convinced that the riveted type of structure possesses elements of safety which its more common and theoretically more perfect pin-connected rival could not show, and that therefore it is a better kind of bridge. Such an opinion, a few years ago, was regarded as evidence of a degree of crankiness approaching heresy. It was contrary to all the teachings of the text books and to the united opinion of their authors. It bucked against accepted practice; it was looked upon as an unpatriotic attempt to depreciate a purely American ideal and elevate foreign and antiquated notions. It was demonstrated over and over again that all riveted work was unscientific; that it was subject to all sorts of indeterminate and highly objectionable stresses; that it was made up of a multiplicity of small parts fastened together by a vast number of little rivets, and must necessarily soon fail in detail. They said that rivet heads flew off so fast that it was a matter of some concern to be in the neighborhood. One fellow told that on the ancient and respectable Victoria tubular bridge at Montreal the rivet heads were so thick that they could be gathered up by the pailful, like picking blackberries, and it was suggested that when passing under this bridge on a boat it would be well to raise your umbrella to keep from being hit by the rivet heads.

But the riveted bridges kept right on doing business and standing up not only under their regular duty, but also under all sorts of abuse and accidents, while every little while we would hear of a pin-connected bridge which got some sort of usage to which it was not accustomed or for which it was not designed, and tumbled down. Those who had any riveted bridges liked them so well that they built more, and those who did not have any heard about them and began to use them. The bridge builders began to look more favorably upon them, and even some of the professors acknowledged that there might be some good in them, so that nowadays the advocacy and use of riveted construction is not as likely as formerly to be regarded as a symptom of paresis.

The trouble with the pin-connected bridges was that while they were all right for ordinary conditions, as soon as a train got off the track or the trusses were struck by a passing object, they were pretty likely to go down, while a riveted bridge would usually stand a vast amount of such banging without dropping into the creek. The ideal pin-connected bridge has a single system of bracing, composed of long and, more or less, massive members, fastened only at the ends and there by a single pin—a system admirable in its simplicity, easy and accurate for computation, cheaply and quickly built and erected. For its legitimate purpose of carrying trains on the track, it is a fit and successful instrument. But its members are particularly ill-fitted to withstand any stress except what they are specially designed for, and the failure of a single member necessarily involves the collapse of the whole outfit. Consequently whenever a train gets cavorting around off the track on one of these bridges it generally necessitates the holding of a post-mortem on the bridge.

In a riveted bridge, on the contrary, the members are so interlaced and fastened, both at the ends and intersections, that anywhere from one to a dozen of them may be and frequently have been broken off entirely, and yet have enough left to hold up the

structure. Such a bridge has quite aptly been compared to a wicker basket. You can make a pretty big hole in it and still have enough left to carry potatoes. One eminent engineer advanced the ingenious argument that a bridge failure caused by a derailed train should not be counted against the bridge, but rather laid to the track department for not keeping its trains on the track. But to most people it matters little where the fault lies as long as the bridge falls down.

The largest user of riveted bridges in this country is the N. Y. C. & H. R. R. R. This road commenced building these bridges in 1858 or 1859, and was so well satisfied with them that it has stuck to them ever since, and now, with a very few exceptions, every bridge on the line of the road is of this type. The result of this policy is that although the road has had innumerable accidents on its bridges—derailments, collisions and everything else—and some of its bridges have been through two or three such accidents, the road has never had an iron bridge go down with a train.

In 1886 a New England professor wrote in his text book: "A few lattice girders executed in wood are still to be found. With these exceptions, this style of truss may be said to be almost unknown in America." At the time he wrote this, the N. Y. C. & H. R. R. R. alone was carrying more miles of its track on riveted bridges than the combined length of all the railroad bridges in New England.

And so it happens that in spite of all the opposition they have met with, in spite of the united disapproval of the books and the predictions of disaster, these bridges have held their own and their use is continually increasing. Some of the older engineers have modified their views and many of the younger ones have become converted after a more thorough acquaintance with the subject, so that today a proposal to build a riveted bridge is received with toleration, or even approval, where a few years ago it would have had the effect of a red rag on a bull.

Rogers Locomotives for the Missouri Pacific.

The Rogers Locomotive Co., Paterson, N. J., has built 15 10-wheel freight locomotives for the Missouri Pacific, to be used on its leased line, the St. Louis, Iron Mountain & Southern. One of these engines is shown in the engraving. The principal dimensions of the engines are as follows:

Cylinders	20 in. x 24 in.
Drivers, diam.	5 ft.
Driving wheel base	12 ft. 6 in.
Total " "	23 ft. 4 in.
Weight on drivers	109,700 lbs.
" " truck	36,000 lbs.
" total	145,700 lbs.
Heating surface, tubes, sq. ft.	1,953
" " firebox "	156
" " total "	2,109
Grate area, sq. ft.	20
Tubes (278), diam., 2 in.; length, 13 ft. 5 in.; thick., No. 11	
Grate	102 1/4 in. x 40 3/8 in.
Boiler, diam. outside front	5 ft.
" thickness of barrel	5/8 in.
" " " dome course	21/32 in.
" " " crown	5/8 in.
" " " tube sheet	1/2 in.
" " " sides	1/2 in.
Wheels, engine truck, diam.	30 in.
Tender, capacity	4,000 gals.
" wheels, diam.	33 in.

The centers of the driving wheels are of cast steel. The tubes are CC iron, Morris-Tasker. The boiler is of carbon steel, and the truck wheels, made by the Rogers Company, are cast iron, with steel tires. Other fittings are:

Safety valves, two 3-in. Coale's, plain; lubricator, No. 9 Nahtan triple sight feed; brakes, Westinghouse and American; boiler covering, asbestos, sectional, Franklin Mfg. Co.; piston packing, U. S. metallic; couplers, Janney, front and rear; tires, Midvale steel; sanding device, Houston; injectors, Friedman non-lifting, Nathan Mfg. Co.; springs, Pickering; brake beams, National hollow.

The tender frames are made of 10-in. steel channels and the trucks are diamond arch bar, with cast steel bolsters. The tender wheels are double plate cast iron, chilled, made by the Ramapo Works.

Passenger Traffic Association.*

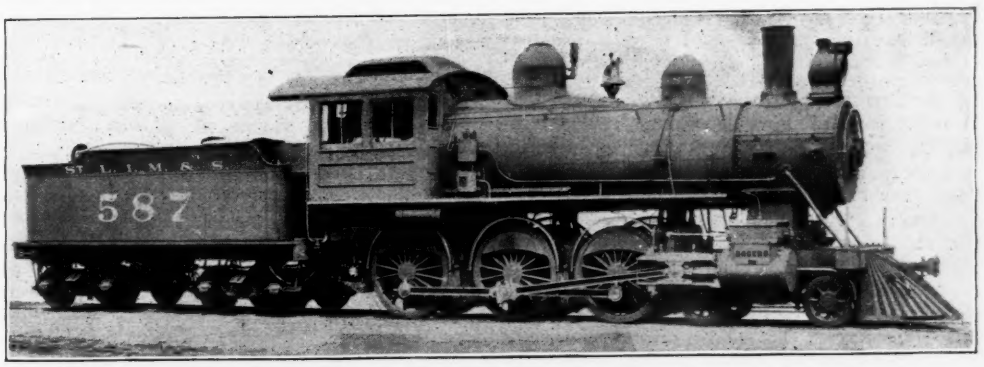
Passenger Associations have troubles without and within. The former may be represented by the magnitude of the undertaking, and by adverse legislation; the latter by the lack of unity of interest and of uniformity of purpose of the membership. Sometimes inherent strength has been nullified by weakness of administration; diversity of interest and condition of membership involving inequalities have rendered permanency of existence impossible; again, disintegration has been brought about by suspicion and secret departure from agreed course of action. The Passenger Traffic Association, under existing conditions, finds its greatest usefulness, first, in developing and bringing to the surface the actual conditions which exist as between competing lines. This contributes to open, straightforward dealing. Secrecy promotes evil, while evil uncovered is half destroyed, and it usually vanishes whenever the light of day is turned upon it. Second in benefit is the persuasive and restraining influence derived from joint confidence. Conclusions and adjustments are usually reached based upon frankness, fairness, equity and broad-minded consideration and which can only be developed and find their best expression in close and intimate personal association. The foundation of successful association work seems to be a bringing together of men whose environments all tend to separate them, and a developing in their relations with each other of all their better quality of mind and heart; in a word, a constant inspiration to sincerity, to joint instead of individual action, to breadth of vision, to unselfishness of purpose, to all higher standards of business methods.

Stability of rates has been accomplished in some directions; as witness the work of the so-called mileage bureaus, the value of which cannot be over-estimated, as mileage tickets have practically become the foundation of local passenger rates. It has often and truly been said that even though these associations effected the saving of but a small per cent. of the revenue involved, they would be invaluable; for disorganization means practical chaos. The usefulness of these organizations is impaired more by reason of lack of legal provision for enforcement and protection than from any other cause.

As society has laws to protect its members against the misuse of dangerous weapons, including that of undue power, so the vast interest represented by transportation companies, with the tremendous power for infliction of unlimited evil, possessed by even the weakest line, should have laws which will permit of entering into and enforcing contracts, and which will protect them, not only as against unjust attack from other directions, but against themselves. The wisest legislation on this subject can only emanate from conscientious, practical men who themselves feel the burden of the onerous and unjust conditions which now exist, and by reason of their acquaintance with the situation and their freedom from restraint and selfish influence will treat all interests fairly and justly. Possibly a commission to be appointed by the President of the United States, to prepare and report suitable legislation, would be practicable. This commission might consist of one United States Senator, one member of the House of Representatives, one member of the Interstate Commerce Commission, one business man engaged actively in commercial pursuits and one traffic official of high standing from the east; and a similar representation from the west and the south, thus making 15 in all. The Interstate Commerce Commission, if it is to attain its highest usefulness, should have an extended membership, which shall embrace two expert traffic officials, one versed in freight, the other in passenger traffic, and at least one representative and active business man.

The traffic official is charged with one of the highest trusts imposed by the railroad service. The highest success is to be found in an energetic striving for the advancement of individual interests, subordinate to the enhancement of the whole. An appreciation of these things should impel all right minded men engaged in this field to so elevate the standard of integrity in dealing with each other and with the public that all shall be convinced that the conduct of the passenger traffic is based upon honesty, integrity and all other good business principles.

*Extracts from a paper by B. D. Caldwell, Chairman of the Western Passenger Association, read before the American Association of General Passenger and Ticket Agents, at Detroit, Oct. 18.



Rogers Ten-Wheel Freight Locomotive for the Missouri Pacific.

Another Steam Motor Car.

We are informed that the Erie & Wyoming Valley Railroad is about to place with the Cooke Locomotive & Machine Co. of Paterson (perhaps the order has already been placed) an order for a steam motor car, of which the body will, we understand, be built by the Jackson & Sharpe Co. The car will be handsomely fitted up, trimmed in oak and will have two pilots. Other particulars follow:

Cylinders	8¼ in. diameter by 8½ in. stroke
Cylinder packing	Spring rings
Driving wheels	42 in. diameter, 37 in. center
Tires	2½ in. thick, Latrobe
Truck wheels	Cast iron center, steel tires, Cooke make
Frames	Locomotive style, hammered iron
Tender capacity	Coal, 1 ton; water, 600 gals.
Boiler	Vertical, 48 in. dia., steel, 165 lbs.
Firebox	42 in. dia., 36 in. deep, steel
Guides and crossheads	Single bar; Laird crosshead
Connecting rods	Hammered iron
Brakes	Steam
Lubricators	Lackawanna
Injectors	Nathan Monitor
Valves	Richardson bal., Cooke make
Gages	Ashcroft
Springs	Pickering
Headlight	Rochester, two

Electric Current Disturbances at Magnetic Observatories.

From careful observations and experiments, it appears that the usefulness of the magnetic observatory at Toronto and the United States Naval Observatory at Washington has been interfered with because of powerful electric currents, used either for arc lighting or for electric railroads. In Washington the disturbances, so far as noticed, have been traced to the Georgetown & Tennalytown road, but were the traffic on this road to stop, the observatory would still be within the radius of influence of the Washington & Chevy Chase road, three-fourths of a mile distant, the effects of which are not noticeable when both roads are running, due to the greater influence of the former line. Efforts thus far made to do away with the evil have apparently availed nothing.

The instruments at the Washington observatory were mounted in January, 1894, and it was immediately noticed that there was a disturbance in the tracing of the vertical force during the hours when the cars were running on the Georgetown & Tennalytown road, but these disturbances were not at first sufficiently serious to destroy the value of the observation. The disturbance remained about the same until the spring of 1897, since which time it has gradually increased. Magnetic values are given to the millionth of a dyne, and it has been found that a single car running on the Echo branch of the above mentioned road increases the vertical force .000075 dyne, and during the months of heavy travel the vertical force would often be increased three or four hundred millionths of a dyne for hours at a time. On the other hand, the effect is sometimes to decrease the vertical force, and the sudden changes which occur are due to the short circuits in the line. In November last the road was bonded by metallic contacts between the ends of the rails, and connections were made with the water mains in the city of Georgetown. There has been no perceptible effect, however, in diminishing the disturbance at the observatory.

In commenting upon these two incidents, Terrestrial Magnetism states: "A remedy might be obtained by legislation, and that remedy could possibly be reached by making it evident that the grounding of powerful electric currents is either wasteful and extravagant, or is working an injury to other commercial enterprises. The remedy, if reached at all, will be reached when the question becomes one of money on both sides."

We have received from Dr. T. C. Mendenhall, President Worcester Polytechnic Institute, the following interesting particulars regarding electric current disturbances:

"Perhaps the earliest instance of disturbance of a magnetic observatory by electric car currents was at San Antonio, Texas, about six or seven years ago. A self-registering observatory was established there by the Coast and Geodetic Survey in a part of the area controlled by the United States Government, and at some distance from the city of San Antonio. It was hoped that by putting it at this point substantial freedom would be secured from any ordinary disturbances. Very shortly after its erection, however, a street car line was run out in the direction of the location of the observatory, the nearest point of the line to the observatory being distant about 1,500 ft. Immediately on the beginning of the use of this line very unusual disturbances began to be manifest in the photographic register, and the record was such, in fact, as to show a tolerably complete history of the goings-on in the street railroad—the starting and running of the cars, stopping at night or at any other time all being faithfully reflected in the photographic record of the magnetic needle. It soon became evident, of course, that it would be necessary to remove this observatory, and a new station was selected at some distance from the city of San Antonio in another direction, to which the instruments were removed, and the work was continued.

"In connection with the Worcester Polytechnic Institute, about eight years ago a small building intended for refined magnetic work was erected on the grounds of the Institute about 200 ft. from one of the city streets. Great care was taken in the erection of the building to avoid the use of iron or steel, but, here again, very shortly after the building was completed and ready for use, the whole value of its careful construction was destroyed by the running of an electric railroad line along the street in question.

"In reference to the disturbance of the magnetic observatory of the U. S. Naval Observatory, it was perfectly well known in advance of the construction of this magnetic station that the electric car disturbances would render it useless. Indeed, those in charge of its construction were warned by others who had had experience that the station would be rendered useless by both electric and light lines. They proceeded, however, in spite of this advice, and have met with the result which was indeed foreseen by those who gave the matter thoughtful consideration."

RAILROAD GAZETTE

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EDITORIAL ANNOUNCEMENTS.

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussion of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially either for money or in consideration of advertising patronage.*

A very important reform in Prussian freight rates went into effect Oct. 1. Heretofore the rates on "package freight," as it is called, that is, shipments of less than half a carload, have been enormously higher than carload and half carload rates. The effect of this has been that in all the larger towns small shipments were made almost exclusively through forwarding agents, who collected enough packages to secure carload rates and charged the shipper rates much less than the railroad package rates, and yet had left a large margin of profit. The new package rates for distances of 31 miles or less are the same as the old, but they decrease for successive zones of 50 kilometers, so as to be very much lower for considerable distances. Needless to say that the forwarders are indignant. To the rest of the world it has always seemed that the old system was very unreasonable and oppressive.

The preliminary report of gross earnings for September, as compiled by the Chronicle, shows a gain of 6.04 per cent., or $2,800,000. The comparison is made with a month of great prosperity. The gain in September, 1897, was $6,386,000, the largest ever shown in any preliminary monthly statement. Therefore it is particularly significant that this year there should still be a gain of more than 6 per cent. And this gain was made in spite of a falling off in the movement of grain and cotton, and is ascribed chiefly to activity of trade. Seven railroads report increases in gross earnings of more than $100,000 each, beginning with the Chicago, Milwaukee & St. Paul, which has a gain of $481,000; the others are the Great Northern, $293,000; Northern Pacific, $263,000; Southern Railway, $239,000; Big Four, $164,000; Cincinnati, New Orleans & Texas Pacific, $122,000, and Pittsburgh, Bessemer & Lake Erie, $106,000.

We discover in the news columns of the Railroad Gazette this week a very modest little item, which seems to us to have great significance. It is there announced that the Lake Shore is getting ready to have built 45 locomotives of a larger type than any heretofere used by that company. The reader who has kept posted knows that under the administration of Mr. Newell millions were poured into the track of the Lake Shore in reducing grades and rectifying the line, until it has come to be in grade and line the cheapest to work of all the great trunk lines. It is also common knowledge that Mr. Newell was, to say the least, not an advocate of increasing the power of the locomotives, and the result has been that the Lake Shore could never fully profit by the great expenditure on its track. We judge that the turning point has come, and that henceforth the policy of the company will be to develop its locomotive power, so as to take full advantage of its admirable road, and when that is done it can reap the full advantage of the wise and remarkable expenditures of the past.

The New Orleans Freight Bureau has now been running five years (with one or two short periods of more or less completely suspended animation), and its annual meeting was held a few days ago. The members congratulated one another on the successful work now being done by Commissioner Helm, and on the presence of $2,500 in the treasury. In New Orleans, as in a number of other cities, many merchants have frequently doubted whether the money they spent in supporting a freight bureau ever brought any return, and about a year ago this feeling was so general that only the energetic work of a few leaders saved the bureau from complete collapse; so that the present condition must be very gratifying. But a perusal of the Commissioner's report of what he has done during the past 12 months leads the reader to wonder whether the railroads find anything gratifying in the existence of such an association of merchants. Mr. Helm's list of the freight-rate reductions that he has secured from the railroads fills about two columns of the Picayune, and they affect a great variety of commodities. If the merchants, after five years' organized effort in this direction, still find dozens of cases in which they can successfully attack the tariffs established by the railroads, the railroad traffic manager may well ask, we should think, whether there is to be any end to the reducing process. Not knowing how large a volume of freight is affected by any of these changes in rates, we are unable to judge of their importance; but, from a cursory reading of the report, we conclude either that many freight rates to and from New Orleans have been too high, or else that the merchants of the city have an unusually smart commissioner.

Telegrams announcing a harvest failure in Russia have probably led some to suppose that that country this year would not compete for the supply of Western Europe with breadstuffs. It must be remembered, however, that Russia is a very large country, and that there may be a crop failure there and at the same time a great surplus of grain for export, just as there is in this country this year one of the most complete failures of the wheat crop ever known (in California), and yet the very largest surplus for export. The crop failure in Russia this year is in the extreme east of European Russia, along the middle course of the Volga and its great tributary from the east, the Kama, several hundred miles east of Moscow, and generally east also of Nishni Novgorod. This district, though in a very high latitude (between 55 and 58 degrees, or as far north as the south part of Hudson's Bay), usually produces a large surplus of grain, supplying the thinly peopled country still further north and also shipping up the Volga to Baltic ports; but its production is a very small part of the total Russian grain production. There is plenty of grain to supply its wants in Southern and Southeastern Russia, but this grain must for the most part reach it by way of the Volga, which closes early. There are some five or six places where railroads reach the Volga, and these are at no great distances from the suffering district; and the river is, as it always has been, the great grain route of the empire, so that the usual currents of transportation pass immediately by the districts which now have an insufficient supply, and, it would seem, ought easily to bring in all that is needed. The steps taken by the government indicate that the anxiety is chiefly to provide forage for the cattle; if these should be lost or consumed during the winter it would be impossible to raise a fair crop next year. For this reason an exceptionally low rate, 0.28 cent per ton per mile, has been made on hay and straw going in, and of 4½ cents per car per mile on live stock going out to be foddered through the winter, with the privilege of shipping the cattle back in the spring for 3 cents per car mile. The suffering district itself is scarcely touched by railroads, but it is not far north of the outlet of the Siberian Railroad.

Austrian Experience with Passenger Fares.

The effect of changes in passenger fares is a very important matter, but usually difficult to determine with anything like exactness. In this country we have had many experiences with great reductions of fares over long routes during railroad wars, when the reduced rates affected but a small part of the total mileage and were known to be temporary. In these cases the different companies concerned usually keep the result to themselves, and the observer can only say that the trains were long, while the rates were low, and has to be satisfied with the general statement that travel was very light for a long time after the rates were restored. The effect of a temporary reduction is likely to be greater, for the time, than that of a permanent reduction. If fares between Kansas City and Chicago are reduced one-half this fall, with almost a certainty that they will be raised again in a few months at most, then many, who otherwise would have made the journey at another time, will make it now, "to take advantage of the cut rates," and some who would have made an entirely different journey will take the Chicago trip instead, so that the effects are different from what they would have been had the reduction been general and permanent.

Such general and permanent reductions have been made in several European countries within the last 10 years, and we have from time to time called attention to them, and to the changes resulting in the amount of travel and the earnings from it. The experience of Hungary has attracted more attention than that of any other country, doubtless; but that of the sister kingdom, Austria, is, perhaps, more deserving of attention, for not only is Austria more like other European countries and the United States in the character of its population and its industries, but it has made not one but a series of experiments with passenger fares since 1889. An account of these, by Mr. P. F. Kupka, of the Emperor Ferdinand Northern Railroad, whom some of our readers may remember as one of the Commissioners of Austria to the Philadelphia World's Fair, makes it easy to follow these experiments and their results. Mr. Kupka's article, which is somewhat elaborate, was published in the Journal of the German Railroad Union.

The first experiment by the Austrian state railroads preceded by one month the famous Hungarian zone tariff. In Austria, however, the reduction of fares extended only to local traffic out of Vienna over short distances, a traffic which has always been heavy, especially on holidays. This tariff was introduced July 1, 1889. The definite effect of it is not reported, but it was very popular and increased travel.

July 16, 1890, the general tariff on all lines of the Austrian state railroads was made on the basis of 1, 2 and 3 kreutzers per kilometer for the three classes, respectively (equal to 0.66 cent, 1.32 cents, and 1.98 cents per mile), applied to a series of zones, tickets to all stations within 10 kilometers paying for 10, for all more than 10 up to 20 paying for 20, and so on, the zones increasing for greater distances by 15, 20, 25 and above 200 kilometers by 50 kilometers. At the same time, all reduced rates for round-trip, etc., tickets were abolished, and the privilege of carrying 55 lbs. of baggage free was also abolished. Further, the fares on express trains, which run at a quite moderate speed, was made 50 instead of 25 per cent. higher than for ordinary passenger trains. In comparison with the old fares, the new ones averaged about 20 per cent. lower for the first class, 10 per cent. for the second, and 30 per cent. for the third class.

The immediate effects of this change, as shown by the travel and earnings of the 12 months ending with June in 1890 and 1891, were:

An increase of 43 per cent. in the number of passengers.

An increase of 1 per cent. in the passenger earnings.

The great increase in travel must have caused an increase in expenses much exceeding the 1 per cent. increase in passenger earnings, and the state railroad management sought to increase the receipts by various slight modifications which went into effect Nov. 1, 1892, with the result that in 1893 the number of passengers was 1 per cent. less, and the passenger earnings were 6 per cent. greater than in 1892.

This was not considered satisfactory; it was believed that the third-class travel, especially for short distances, did not pay expenses; that the first and second-class travel were reduced by too great a difference in fares, and that the 50 kilometer zones were too large, requiring the same payment for 201 as for 250 kilometres; as the profits of the state railroad system were but 2.7 per cent. on their cost an effort to increase them seemed justified.

Finally, a new system was adopted, which was applied on all the state railroads Sept. 1, 1895, in which the rate per mile diminishes with the distance traveled, as follows, in kreutzers per kilometer [1 kr. per km. equals 0.66 cent per mile]:

	Class. III.	II.	I.
Up to 150 kilometres	1.25	2.25	3.75
151 to 300 "	1.15	2.15	3.65
301 to 600 "	1.00	2.00	3.50
Over 600 "	0.80	1.80	3.30

Ten kilometres is the unit of distance—that is, the fare for any distance less than 10 kilometres is the same as for 10 for any distance greater than 10 up to 20, the same as for 20, and so on. For express trains there is an addition of ½ kreutzer, 1 kreutzer and 1½ kreutzer per kilometer to the ordinary fares for the three classes, respectively.

All baggage is charged for at the rate of 0.2 kreutzer for every 10 kilograms 1 kilometre (which amounts to 0.66 cent per 110 lbs. 1 mile) for distances of 300 kilometres or less, and 0.15 kreutzer for greater distances.

The application of these rates to the route between New York and Chicago would give for ordinary trains (if there were any of low enough speed) $5.07 for the third class, $11.70 for the second, and $20.64 for the first. For express trains, which would rank all through trains between Chicago and New York, the fares would be $7.60, $17.55 and $30.96. For the American allowance of 150 lbs. of baggage there would be an additional charge of $6.67, unless there

is an error in the printed statement of the baggage rate.

In 1896, the first entire year under this tariff, compared with 1894, the first entire year before it, there was an increase of about 4 per cent. in the passenger traffic and an increase of 17 per cent. in the passenger earnings. In 1895, when two-thirds of the year the old tariff prevailed, the traffic was nearly 4 per cent. greater than in 1896, but the earnings were 4 per cent. less. The average receipt per passenger mile was 0.856 cent in 1894, 0.914 cent in 1895, and 0.967 cent in 1896.

The Austrian Government exercises more or less control, according to the contracts in each case, over the several private railroads. Among the chief of these, with a system in a populous and progressive district, is the Emperor Ferdinand Northern Railroad, and on this the Government had authority to fix the rates. The tariff system adopted on its own lines July 16, 1890, and since changed, it ordered to take effect on the Northern Railroad April 1, 1891, where it has remained unchanged, notwithstanding the important change made on the state railroads. This tariff, it will be remembered, was based on rates of 1, 2 and 3 kreutzers per kilometre for the three classes, respectively, applied to zones of 10 kilometers interval for five zones, of 15 kilometers for two zones, of 20 kilometers for the following zone (81 to 100 kilometers), of 25 kilometers for four zones, and of 50 kilometers for all distances above 200. Reducing distances and currencies this gives the following fares for ordinary trains, increased one-half for express trains:

Miles.	Class. I.	II.	III.
6 and under	$0.25	$0.16	$0.08
7 to 12	0.49	0.33	0.16
13 " 19	0.74	0.49	0.25
20 " 25	0.98	0.66	0.33
26 " 31	1.23	0.82	0.41
32 " 40	1.60	1.07	0.53
41 " 50	1.97	1.31	0.66
51 " 62	2.46	1.64	0.82
63 " 77	3.08	2.05	1.03
78 " 93	3.69	2.46	1.23
94 " 108	4.30	2.87	1.43
109 " 124	4.92	3.28	1.64
125 " 155	6.15	4.10	2.05
156 " 186	7.38	4.92	2.46
187 " 217	8.61	5.74	2.87
218 " 249	9.84	6.56	3.28
250 " 280	11.07	7.38	3.69

These rates are on the average less than the previous rates of the Northern Railroad by about 25 per cent. for the first class, 33⅓ for the second, and 50 per cent. for the third class—a sweeping reduction, therefore. Their effect, however, was modified by the abolition of round trip and other reduced rates, and of free baggage allowance, and by the addition of 50 per cent. for express trains (formerly 25 per cent.). This latter has had considerable effect even on third-class travel, the ordinary trains being very slow.

The Northern Railroad has had no additions to its system, and this reduced tariff has continued in operation ever since its introduction, which is long enough for its natural effects to develop, which can hardly be said of the short time of its existence on the state railroads. It is possible that it has had a greater effect on traffic than if it had prevailed on the other Austrian railroads also. The fact that the Northern Railroad has had lower rates than the other lines has doubtless caused some travel on its system which otherwise would have gone to other lines; but not so much as if it had greater landscape attractions. Pleasure travel, out of Vienna, at least, is likely to prefer other routes, over which it can reach, at a moderate distance, some of the most attractive scenery in the world.

In examining the results of this change in rates, we must bear in mind what the course of traffic had been before it was made. The Northern Railroad had an increasing passenger traffic under the old rates. It increased by about 500,000 passenger journeys yearly from 1887 to 1890, in which time the increase in travel per mile worked was 18½ per cent.

Taking 1890 as the point of departure, represented by 100, the growth in number of passenger journeys, passenger mileage, passenger train mileage and passenger car mileage is shown below:

	1890.	1891.	1892.	1893.	1894.	1895.	1896.	1897.
No. passengers	100.0	122.3	135.0	146.2	164.9	175.9	183.1	198.8
Passenger miles	100.0	123.8	138.1	148.4	165.2	177.7	185.5	192.7
Pass. train miles	100.0	102.8	106.6	107.5	111.4	119.4	125.6	126.8
Pass. car miles	100.0	110.1	123.4	128.1	135.1	141.4	150.7	159.0
Earnings:								
Pass. and baggage	100.0	96.5	98.1	104.5	111.2	119.4	124.3	129.1
Per passenger	100.0	78.9	72.7	71.6	67.5	67.9	67.9	66.8
Per pass. mile	100.0	77.9	71.0	70.4	67.3	67.2	67.0	66.9
Per pass. train mile	100.0	93.8	92.0	97.2	99.9	99.9	99.0	101.7
Per pass. car mile	100.0	87.6	79.5	81.5	82.3	84.4	82.5	81.2

This is a table well worth studying. The charges in 1891, we must remember, were for a year, one-fourth of which was under the old rates. For the first full year of the reduced rates we have an increase of 35 per cent. in the number of passengers and 38 per cent. in the passenger mileage, accompanying a reduction of 29 per cent. in the average passenger rate. The gross passenger train earnings decreased 1.9 per cent. meanwhile, and with the increase of 38 per cent. in passenger traffic this means a considerable decrease in the net earnings. But perhaps the chief value of this table is in its presentation of facts which give some clue to the extent to which the expenses were increased by the great growth of traffic. The addition of 38 per cent. in travel in 1892 over 1890 was conducted with an increase of only 6.6 per cent. in the passenger train mileage and of 23.4 per cent. in the passenger car mileage—with more cars in a train and more passengers in a car, the addition to the traffic thus must have required a proportionately smaller increase in expenses.

This is what we may call the immediate effect of the reduction in fares. The figures since 1892 show its continued effect. The passenger traffic increased 92.7 per cent. from 1890 to 1897; under the old tariff it would have increased in that time, according to the experience from 1887 to 1890, 48 per cent.; this addition to traffic has been conducted by an addition of 26.8 per cent. to the passenger-train mileage and 59 per cent. to the passenger-car mileage. The passenger and baggage earnings have increased meanwhile 29.1 per cent.—slightly more than the train mileage, but only half as much as the car mileage, so that the increase in net earnings probably does not equal the increase in expenses, though the difference may not be considerable. The average passenger journey has remained almost stationary in all these years—it must be remembered that 280 miles is the longest journey possible on this system. The growth of travel continues, and though not at the same rate as in the first years after the reduction of the rates, yet quite rapid. Thus against an increase of 18½ per cent. from 1887 to 1890, and of 48.4 per cent. from 1890 to 1893 (the first three-year period after the reduction), we have a gain of only 16.6 per cent. from 1894 to 1897, not quite as fast as immediately before the reduction, which recalls the experience of the French railroads since their reduction of fares. Generally it seems the stimulus of low fares is exhausted in a few years, and the rate of growth of travel then falls to something like the previous rate, though the amount of the growth is much larger. This is natural and desirable, for a very large percentage of growth yearly would mean, after a not very long period, that the population would spend a large part of its time in traveling. The increase in average train-loads has continued without interruption, though not evenly. This is so important an element in the cost of transportation that we give the average passenger-train load (number of passengers) and the average number per passenger car-axle, as follows:

	1890.	1891.	1892.	1893.	1894.	1895.	1986.	1897.
Pass. per train	67.3	81.0	87.1	92.9	99.8	100.1	99.4	102.2
Pass. per axle	4.315	4.851	4.827	4.997	5.276	5.423	5.313	5.231
P. axles per train	15.6	16.7	18.1	18.6	18.9	18.4	18.7	19.5

There are passenger cars with three and four axles in Austria, but the great majority have but two. The proportions of such cars vary on different railroads, and we cannot say what they are on the road in question. Counting all as two-axle cars, we find the average train varying from 7.8 to 9.75 passenger cars, which is large for an average, even for four-wheeled cars, which, however, have, at least, for the lower classes, much more than half of the seating capacity of our eight-wheeled cars. The average passenger trainload on the Empire Ferdinand Northern Railroad, however, even before the reduction in fares, was one-half greater than the average in this country, and equaled on few of our lines with heaviest passenger business. It has increased just about one-half since the low rates were introduced, but has been practically stationary for the last four years.

The average receipt per passenger mile for these eight years has been, in cents:

1890.	1891.	1892.	1893.	1894.	1895.	1896.	1897.
1.343	1.047	0.964	0.945	0.904	0.902	0.900	0.899

Since 1891, the changes can be due only to the relative growth of travel of the several classes. The result indicates a somewhat more rapid growth in the lower than in the higher classes.

Although the trainloads have become what in this country would be considered very large, the proportion of the seats occupied is not great. In the year 1896, for which alone it is reported, it was 28⅓ per cent., while on the Prussian State Railroads, with their "unreformed" tariff, the proportion was 26½ per cent.

If it is asked why the Austrian State Railroads felt compelled to change and advance the rates of a tariff which, on the whole, has proved successful on one of the Austrian railroads, it may be replied that the Emperor Ferdinand Northern was and is a profitable railroad, serving a dense population and having before the change of rates the heaviest passenger traffic in the Kingdom, while many of the state lines are in a thinly peopled country with light passenger traffic, where no rates, however low, could develop a heavy traffic, however much they might increase it. But a large traffic is essential to the economical conduct of the business; without large trainloads it is impossible.

Annual Reports.

Chicago, Burlington & Quincy.—The fiscal year of this company formerly ended on Dec. 31, but was changed in 1897 to June 30. The report now at hand covers the operations of the last 18 months, or since Dec. 31, 1896. The revenue and traffic figures are given, however, in such form that comparisons with the totals for the 12 months to June 30, 1897, can be made. The income account for the last two years ending June 30, is shown below:

	1898.	1897.	Inc.
Freight earnings	$30,543,640	$24,007,348	$6,536,292
Passenger earnings	8,163,042	7,226,266	936,776
Mail, express, etc.	4,103,480	4,292,573	*189,093
Total gross	$42,800,162	$35,526,186	$7,273,976
Oper. expenses and taxes	27,810,886	22,661,769	5,149,117
Net earnings	$14,989,276	$12,864,417	$2,124,859

*Decrease.

The increase in gross is the largest yet reported by any one company for the same period. It is over 20 per cent., but was to a very large extent absorbed by the higher expenses, which represent expenditures for improvements and equipment. The gain in net earnings, however, is nearly 15 per cent. The income account shows a balance of $6,082,793 for dividends, equal to nearly 7½ per cent. on the capital stock. Only 4½ per cent. was distributed, and with the special renewal fund charged against the balance, the net surplus for the year was $1,392,667. The company increased its quarterly dividend rate during the year from 1 per cent. to 1¼ per cent., and is now paying 1½ per cent. quarterly.

The tons and passengers carried are not given, but the ton-miles and passenger-miles and the train mileage are given below:

	1898.	1897.	Inc.
Ton miles*	3,295,586	2,750,737	544,849
Freight train miles	18,850,000	15,915,000	2,935,000
Ton mile rate	c .919	c .867	† c .052
Freight train miles per mile of road	2,625	2,217	408
Passenger miles	362,303,000	316,022,000	46,281,000
Passenger train miles	10,425,000	10,104,000	321,000
Passenger mile rate	c 2.23	c 2.27	† c .04

* 000 omitted.
† Decrease.

The increases in ton-miles and freight train miles were about the same, 19 per cent. and 18 per cent. respectively.

For the first time the company publishes its expenses, divided according to the Interstate Commerce classification, and these follow. No comparisons, of course, are possible:

Maintenance of way and structures	$5,456,069
Maintenance of equipment	6,330,358
Cond. transportation	13,346,761
General	1,139,031
Total	$26,272,219

Great Northern.—The annual report for the year ending June 30 is a record of a prosperous year, in which further advances were made in economical working, and much active work was done in improvements and additions. The revenue accounts show heavy gains over the 1897 totals, in both gross and net, not only on the Great Northern proper, but on its various subsidiary companies. In the following table the comparisons are for what is known as the Great Northern proper:

	1898.	1897.	Inc.
Miles operated	4,466	4,415	51
Freight earn.	$18,056,047	$15,841,331	$2,214,716
Pass. earn.	3,311,381	2,527,109	784,272
Total gross	22,577,544	19,436,061	3,141,483
Oper. expenses	10,854,706	10,701,871	152,835
Net earn.	11,722,839	8,734,189	2,988,650
Net income, less taxes	11,021,897	8,131,540	2,890,357
Total net income	$12,512,254	$8,763,688	$3,748,566

Of the above changes, the leased Manitoba lines account for $2,645,000 of the higher gross earnings and for $3,185,000 of the improvement in net income. The consolidated revenue account of the company, including the earnings of the Northern Steamship Co., the Great Northern Express Co., and Conlee Coal Co., etc., is given below:

	1898.	1897.	Inc.
Gross earn.	$25,021,194	$21,736,225	$3,284,969
Oper. expenses	12,759,414	12,622,418	136,996
Net earn., less taxes	11,552,182	8,506,004	3,046,178
Miscel. income	1,523,715	664,921	858,794
Total net income	$13,075,897	$9,170,925	$3,904,972

The company has been earning in recent years over 10 per cent. on its stock (paying 6 per cent.) On the amount outstanding at the close of the last fiscal year, $25,000,000 (since doubled), the balance reported as available for dividends, equals 14 per cent. This is after deducting $1,500,000 for permanent improvements and renewals, and $750,000 for building the Cascade Mountain tunnel from the income of the year. The income account of the company follows; the net profit on the leased Manitoba lines, as stated, is less the $2,250,000 appropriated for special funds as already explained:

	1898.	1897.
Profit, Manitoba leased lines	$1,090,303	$937,716
Int. and div'ds. on sec. owned	1,328,776	1,094,371
Leased line rentals	164,416	187,256
Bills receivable	15,919	15,838
General interest	164,359	73,557
Equip. and car service rentals	58,067	56,904
Profit on Treas. securities sold	419,845	.....
Other income	330,095	91,626
Total income	$3,571,769	$2,457,267
Dividends (6%)	1,500,000	(5%) 1,250,000
Balance	$2,071,769	$1,207,267

The charges to capital account in 1898, on account of the proprietary companies were $5,049,000, nearly all of which was due to the Eastern of Minnesota, which owns the new line from Duluth to Fosston. The amount includes the purchase price of the Duluth, Superior & Western, 109 miles, and equipment, including 600 ore cars, on which $235,000 car

trusts are still due and were assigned. Various branches in Dakota and Minnesota were acquired, or are being built, and since the close of the fiscal year 217 miles of the Spokane Falls & Northern in Washington and British Columbia have been purchased.

The new equipment includes 45 locomotives and 3,500 freight cars, purchased to equip the new Duluth-Fosston line. A new yard to accommodate 1,500 cars is being built midway between St. Paul and Minneapolis, and will centralize the transfer business at those points. Twenty miles of additional side and passing tracks, and 24 coaling stations have been built, and the water supply has been improved. The relaying of the main track with 75-lb. rails is being continued, about 124 miles having been completed last year. The widening of the embankments on the Eastern Minnesota has been finished for 60 miles. The bridge improvements included building 2,200 ft. of steel work and filling 17,200 lineal ft. of trestles and bridges.

The company is able to report a further improvement in its traffic operations and economy of train mileage. Its average train load is now 316 tons, having gained 35 tons, 12½ per cent., in the year. In 1893 the train load was about 235 tons. The ton mileage increased over 1897 nearly 17 per cent., or nearly double the ratio of gain in the tonnage carried, due to the longer freight haul consequent upon the development of business along the more recently built Western lines. With nearly 17 per cent. increase in ton-miles, the freight train miles were only 1.8 per cent. above the 1897 figure, while empty car mileage actually decreased. The ton-mile rate fell off 2½ per cent., but the average receipts per freight train mile are higher than in 1897, while the expenses are lower.

The more important traffic statistics are given below, and will be found a most interesting record:

Freight.	1898.	1897.	Inc.	P. c.
Frt. train miles	5,541,497	5,442,659	98,838	1.8
Mixed train miles	585,687	452,901	132,786	29.3
Ton miles, †	1,937,956	1,657,224	280,732	16.9
Revenue tonnage	8,089,600	7,471,900	617,700	8.3
Loaded car miles	131,345,000	116,801,000	14,544,000	12.5
Empty car miles	36,376,000	34,483,000	*157,000	.4
Av. car load	14.75	14.19	.56	4.0
Av. train load	316.3	281.1	35.2	12.5
Train mile earn	$2.99	$2.73	$.26	9.5
Ton mile rate	c.932	c.956	*c.024	2.5
Passenger.				
Train miles	3,351,700	3,205,200	146,500	4.6
No. pas. carried	1,715,700	1,498,300	217,400	14.5
Pass. miles	149,041,000	97,544,000	51,497,000	52.8
Train mile earn	$1.26	$1.03	$.23	21.5
Pass. mile rate	c. 2.222	c. 2.591	*c. .369	14.2

† 000 omitted; * decrease.

The Scalpers.

The passenger traffic to and from Pittsburg on the occasion of the Knights Templar conclave last week is said to have been the heaviest ever handled by the railroads in that vicinity. We have seen no accurate estimate of the number of passengers, but judging from the reports in the local papers of the arrangements at the stations and in the passenger-car yards, the facilities of the several roads must have been used nearly or quite up to their limit. Before the beginning of the conclave the railroads took vigorous action against the ticket scalpers. Arrangements were made to have the joint agent date the return portions of round trip tickets by a cipher word of four letters, punched through the body of the ticket, this word to be changed each day; and just before the passengers began to arrive proceedings were begun in the County Court and temporary injunctions secured against all the ticket brokers in the city (75, it is said) restraining them from handl ng any of the tickets for this special occasion. A bold defense was made, but after hearing it Judge White continued the restraining order; requiring the railroad companies, however, to refund to the brokers all money they had paid for tickets previous to the granting of the injunction. At the hearing the brokers presented affidavits asserting that on previous occasions the railroads had not only allowed the brokers to handle excursion tickets, but had sold them blocks of return portions. It does not appear from the newspaper report that the dates of the alleged arrangements with the railroad companies were given.

On the occasion of a "carnival" at Des Moines, Ia., the first week in October, the City Council of that city passed an ordinance, effective only from Oct. 2 to Oct. 10, regulating the business of ticket brokerage. According to this ordinance every broker was required on demand to give the buyer a certificate describing the ticket and naming the amount paid for it; offering tickets by shouting in public places was forbidden, and to sell a ticket which should prove invalid was made unlawful. Violation of the ordinance made the violator liable to a fine of $50.

Under the resolutions adopted at the mercantile and railroad conference held in Chicago early in October, under the auspices of the National Association of Merchants and Travelers, a central anti-ticket scalping committee has been organized, with headquarters in Chicago, which will have sub-committees in the principal cities of the country. The Central Committee, of which J. V. Farwell, Jr., of Chicago, is chairman, has 21 members, representing Chicago, New York, St. Louis, St. Paul, Minneapolis, Boston, Detroit, Milwaukee, Indianapolis, Peoria, Sioux City, Des Moines and St. Joseph. This committee held a meeting in Chicago Oct. 14 to perfect plans for carrying on the work.

Even in far Siberia wheat growers were quick to take advantage of the remunerative prices which a kind Providence and Mr. Joseph Leiter had made for them. Rather, they were quick to endeavor to take such advantage, but the Siberian Railroad seemed hostile to the farmers, and wheat which they delivered at its stations to be forwarded last April was until August in reaching the Baltic ports to which it was consigned, and when it got there whole carloads were completely spoiled and others were as much as three tons short; and meanwhile the price had fallen some $20 per ton. The wheat was piled in sacks on open platforms at the Siberian stations, where it has remained most of the time since, till the railroad was ready to haul it. When it was manifest that it was already quite spoiled, it was not loaded in the cars, which accounts for the shortage. How any of it kept in marketable condition does not appear, but perhaps the upper tiers of sacks sheltered the lower ones. For the shortage and the grain completely spoiled the railroad is responsible, but it is reported not for the fall in price due to delay in delivery; which is unlike the general rule in European countries, where the time within which freight may be delivered is strictly limited, according to distance. Meanwhile the delay in this case is said not to have been due to the Siberian Railroad, but to an imperfectly equipped line, which connects it with Western Russia. At one time there were 6,000 carloads of wheat at the Western terminus (Cheljabinsk) of the Siberian Railroad, waiting to be forwarded over this connecting line.

TECHNICAL.

Manufacturing and Business.

The Berlin Iron Bridge Co. is erecting the extension of the foundry for the Benjamin Atha & Illingworth Co., at Harrison, N. J. This extension is 51 ft. wide and 152 ft. long. The framework is of steel throughout. The sides are covered with corrugated iron on steel purlins. The side columns support a 30-ton electric crane, having a span of 46 ft.

Robert W. Hunt & Co. and Hallsted & McNaugher have removed their New York offices from No. 80 Broadway to No. 71 Broadway, Empire Building.

The following have been elected officers of the Troy Malleable Iron Co.: President, William A. Grippen; Vice-President, Waldo K. Chase; Treasurer, Edwin Veghte; Secretary, Augustus Veghte. The directors are John H. Whittimore, William A. Grippen, William Sleicher, Jr., Edwin Veghte and Augustus Veghte.

Among shipments made this week by the Hilles & Jones Company, Wilmington, Del., was a set of plate bending rolls capable of bending ¾-in. plate 12 ft. wide for the Oregon Short Line, Pocatello, Idaho.

The Dean-Westbrook Bridge Co. of New York has been incorporated with a capital of $10,000. The directors are Casper W. Dean, John A. Westbrook and Ralph Westbrook of New York, and R. E. Sweeney of Ridgefield, N. J.

The Otto Gas Engine Works of Philadelphia have installed a number of large plants, among which are two 130 actual h. p. engines for the Sistersville Electric Light Co., Sistersville, W. Va.; two 130 actual h. p. for the Stockton Gas & Electric Light Co., Stockton, Cal.; two 130 h. p. for Williamson, Wickstrum & Co., Clay Centre, Kan.; two 130 h. p. and two 60 h. p. for Lima & Honeoye Falls Electric Light & Power Co., and three 100 h. p. for Danbury & Bethel Electric Light & Power Co., Danbury, Conn. The company will install about 500 h. p. at the Jersey City yard of the Erie.

The American Tool Works Co. has been reorganized, owing to the retirement of President Charles Davis. Additional capital is being put in, and A. B. Vorheis has been elected President, Franklin Alter, Vice-President; B. B. Quillen, Acting Manager, and L. E. Vorheis, Assistant Manager.

The Battle Creek Steam Pump Co., Battle Creek, Mich., has increased its capital stock from $100,000 to $200,000.

In our issue of Oct. 7 we noted that the Standard Contracting Co. of Cleveland had secured a contract for a large dock to be built at Conneaut Harbor. This dock is for the Pittsburgh & Conneaut Dock Co., of which J. H. Reed is President, and G. H. Hutchinson Chief Engineer. It will be 1,400 ft. long, and will cost approximately, with tracks, $170,000. It is expected to be finished by Feb. 1, 1899.

C. A. Delaney, formerly Superintendent of the Richmond Locomotive & Machine Works, has been appointed Superintendent of the Dickson Locomotive Works, Scranton, Pa.

The Electric Railway & Manufacturers' Supply Company has been incorporated in California, with a capital stock of $50,000. The Directors are: W. S. J. Bowe, Samuel H. Taylor, Frank Frisbee, H. P. Bowle and H. S. Hogan.

Iron and Steel.

It is reported that work has begun on two new blast furnaces and an ore-shipping dock for the South Chicago plant of the Illinois Steel Co.

E. H. Gary has been elected President of the Federal Steel Company. H. H. Porter will be chairman of the board, and Richard Trimble Secretary and Treasurer. The Directors are: J. P. Morgan, Robert Bacon, D. O. Mills, R. P. Flower, C. C. Cuyler, Charles C. Cliff and Charles McVeagh of this city; Marshall Field, Norman B. Ream and H. H. Porter of Chicago; Samuel Mather of Cleveland, Nathaniel Thayer of Boston, Benjamin C. Van Dyke of New Jersey and E. H. Gary.

The Board of Directors of the Cambria Iron Co. has called a special meeting of the stockholders to be held in the office of the company in Philadelphia on Oct. 26, 1898, for the purpose of voting for or against the lease of the property and franchises of the Cambria Iron Co. to a corporation to be organized in Pennsylvania under the name of the Cambria Steel Co. We gave an outline of the plan in this column in our issue of Oct. 7.

New Stations and Shops.

The Western of Alabama has awarded a contract to the R. D. Cole Manufacturing Company of Newnan, Ga., for building a new two-story office building, 45 ft. x 158 ft.; a receiving freight station, 34 ft. x 400 ft. and a delivering freight station, 50 ft. x 400 ft. The approximate cost is $50,000.

In our issue of Oct. 7 we noted that the Southern Pacific was about to build a pattern shop in Sacramento, Cal. The building will be 64 ft. x 145 ft., of brick on pile foundation, two stories high, and divided into equal-sized rooms by a cross-wall. Roof, pitch and gravel; doors, fireproof; elevator at one end.

The loss caused by the recent fire at the shops of the St. Louis Southwestern, located in Pine Bluff, Ark., amounted to about $17,300 on buildings and material therein, fully covered by insurance. The damaged portion will be rebuilt at once.

According to press dispatches, the Electric Terminal Company, organized from the stockholders of the suburban electric lines running into Cleveland, has taken out a building permit for an eight-story union station to be built in that city at a cost of $140,000.

It is reported that the Cleveland, Cincinnati, Chicago & St. Louis and the Illinois Central will build a new union station at Mattoon. We are advised by an officer of the first-named road that the station at Mattoon, which is now used jointly by both roads, has been recently repaired and that a new station is not contemplated.

The Gulf, Colorado & Santa Fe has subscribed to and is interested in two new Y. M. C. A. buildings to be put up at Temple and Cleburne, Texas, respectively, within the next 12 months. Plans are now being drawn. The buildings will cost about $10,000 each.

Representatives of the Plant System, the South Carolina & Georgia, the Atlantic Coast Line and the Business Men's League of Charleston, S. C., have had a conference looking to the building of a union station in Charleston.

New Southern Pacific Ferryboat.

A San Francisco press dispatch states that the Southern Pacific Company has launched a new ferryboat, the Berkeley, to run between San Francisco and Oakland, which is claimed to have the largest passenger cabin in the world. It will seat 1,000 passengers, and there are seats for 735 persons on the outside decks. The vessel has one screw at each end. It was built by the Union Iron Works.

Proposals for the Algiers Dock.

The time specified for opening the proposals for a combined floating and graving steel dock, with shore connections and appurtenances, for the U. S. Naval Reservation, Algiers, La., has been postponed from 1 o'clock p. m. on Monday, Oct. 31, 1898, until 1 o'clock p. m. on Wednesday, Nov. 30, 1898.

Painting Locomotives and Tenders.

The New York, Chicago & St. Louis has found that considerable saving can be made over the present methods of painting and lettering locomotives and tenders. This road now paints the tenders with asphaltum applied with a broad brush, while the letters and numbers, instead of being made on the tenders and locomotives themselves, are painted on wooden sign boards, which are held in place by bolts. In this way all the lettering can be done in the paint shop, while the engine and tender are undergoing repairs, so that the locomotive is not kept out of service several days while being lettered. Mr. Mackenzie, the Superintendent of Motive Power, states that in this way the painting costs between $30 and $35 less for each locomotive than it did formerly.

Fenders in Chicago.

The North Chicago Street Railway Co. now has all its cable grip cars equipped with fenders, the work being completed Oct. 10. The work of equipping the electric cars of this road was commenced last week and will soon be finished. The fenders are of steel, painted brown, and are fastened to the front plat-

forms, curving down and back and then projecting forward about 2 ft., the front line of the fender being about 2 in. from the track. The cars of the West Chicago line are also being fitted with fenders and it is expected that all the principal Chicago street roads will have their cars supplied by Jan. 1.

Another Nicaragua Canal Company.

A dispatch from Nicaragua says: "Edwin F. Cragin of Chicago, Edwin Eyer of the firm of W. R. Grace & Co., New York City, and Frank S. Washburn of New York City, have arrived at this capital. The object of their mission is to obtain from President Zelaya authority to attempt to organize a company and obtain the necessary capital, estimated at $100,000,000 in gold, to construct a canal across Nicaragua. President Zelaya has placed them in conference with the Acting Minister of Public Works, in order to ascertain what they propose to accomplish and what guarantees they will offer."

Sixteenth Street Viaduct, Chicago.

The new viaduct on Clark street, near Sixteenth, which has been built in connection with the track elevation work at that point, is about being opened to traffic as we go to press, the intention being to open it formally in the presence of the city officials and of the officers of the railroads affected by the work. This viaduct covers the depressed tracks of the Chicago & Western Indiana, and the Atchison, Topeka & Santa Fe roads. It is 122 ft. long, 80 ft. wide and 16 ft. 6 in. above the tracks. The north approach begins 200 ft. away on Clark street, the grade being 5 per cent., and the retaining walls 12 ft. thick. The south approach begins under the elevated tracks of the St. Charles Air Line and is 150 ft. long, with a 6 per cent. grade. The trolley car tracks have 26 ft. on the west side set apart for them, the driveway for vehicles is 42 ft., and the sidewalk for pedestrians is 12 ft. wide. Ornamental railings divide the three ways. The structure is built of steel, with concrete floor, and the approaches are paved with vitrified brick. The cost of the viaduct will be about $75,000. With the opening of this viaduct the Clark street trolley cars, which have been reaching the business district by way of Wabash avenue and State street, will resume operations over their old line.

Pneumatic Riveting on Bridges.

The Illinois Central is now putting in a new floor system and strengthening the draw span of its bridge at West Point, Ky. This span is 265 ft. long, and is supported on a stone center pier 65 ft. above the water. The interesting feature of this work is that all the rivets are being driven by Boyer pneumatic hand hammers, while the compressed air is furnished by a 12-h. p. Fairbanks-Morse direct-connected gasoline engine and air compressor, located on the bridge about the middle of the span. A storage tank is placed near the compressor, from which pipes are run along the bridge having hose connections at suitable intervals. The rivets which are being used are ¾ in. and ⅞ in. in diameter, and it is estimated that one hammer does the work of about three men riveting by hand.

The New York & Ottawa Bridge.

A contract for the removal of the fallen spans of the New York & Ottawa Bridge has been let to the Collins Bay Rafting & Towing Company. The rebuilding of the pier is to be begun at once, and must be completed above the water line before winter.

THE SCRAP HEAP.

Notes.

According to a British Government report, lately issued, it appears that the average wages of the employees on 17 large English railroads have increased during the past year from $6.20 a week to $6.30.

David Garlington, one of the Santa Fe train robbers, has been found guilty of murder at Fort Worth, Tex., and sentenced to death. George Moore, another one of the robbers, was sentenced to imprisonment for life.

Frank P. Sargent, Grand Master of the Brotherhood of Locomotive Firemen, having been urged to retain his position at the head of the Brotherhood, has resigned his place on the National Labor Commission, to which he was recently appointed by President McKinley.

At Manchester, Eng., recently two boys, arrested and brought before a magistrate for placing obstructions on the track of the Great Central Railway, which they claim they did simply to see the fun when the obstructions would be thrown aside, were ordered each to receive six strokes with a birch rod.

A special train carrying officers of the New York Central was run from Chicago to New York over the Lake Shore & Michigan Southern and the New York Central & Hudson River on Oct. 11 in less than 20 hours. The time from Chicago to Buffalo was 10 hours 53 minutes, and from Buffalo to New York 8 hours 45 minutes.

The Superior Court at San Francisco has refused to compel the Market Street Railway Company (controlled by the Southern Pacific) to comply with the order of the State Railroad Commissioners for statistics looking to the reduction of street car fares. The court holds that the Commission has no power to fix rates on street car lines.

The Northern Pacific Express Co. has filed its annual report with the State Railroad Commissioners of Minnesota, showing the business of the company as follows: Gross earnings, $814,280; income from other sources, $24,100; total income, $838,345; operating expenses, $302,836; taxes, $1,562; total expenses, $304,399; balance, $533,966; less payments to railway and steamship companies for transportation and other considerations, $533,966.

At the annual meeting of the Old Colony Railroad in Boston a few days ago there were present two stockholders from the Cape Cod Division, five from the Plymouth Division, three from the Taunton Division and one from the Northern Division, a total of 11 from these divisions; but the number of stockholders who went to Boston on that day from the Cape Cod Division alone was 600, so that it would appear that 598 visited the city for the purpose of shopping or visiting their cousins. Large numbers came from the other divisions. "It is very evident," says the Boston Herald, "that the stockholders of that road do not lie awake nights for fear their interests will suffer from the misconduct of the officers." It is also quite evident that a free ride worth from $2 to $6 is thoroughly appreciated by the one-share stockholders.

The Electrical Engineer Institute of Correspondence Instruction.

This is the name adopted by the proprietors of the Electrical Engineer, 120 Liberty street, New York, for their school for teaching electrical subjects by mail. A pamphlet entitled, "Can I Become an Electrical Engineer?" has been issued, describing the courses of study and giving such information as is desired by students. Supplements to this pamphlet describe special course No. 1, telephoning; and special course, No. 2, telegraphy. The first monthly payment is $2.

The Chaplain of the D. & R. G.

The members of the Roadmasters' Association, at their recent meeting in, Denver, Col., had the novel experience of seeing and hearing a railroad chaplain. A local newspaper describes the work of this official as follows:

"A railroad chaplain, probably the only official of the kind in this country, if not in the whole world, is employed by the Denver & Rio Grande. He is the Rev. John Brunton, and a service of 30 years on railroads as engineer and conductor, before he became a clergyman, gave him a special training for his present duties. His time is devoted entirely to the service of the company. Among his duties are attendance on the sick or injured employees in the hospitals, rendering assistance at wrecks, officiating at public meetings in charge of the company, and looking after a reading-room for the employees of the company at Pueblo. When he is not engaged in these duties, he spends his time among the men in the shops or on the road or track, often interceding for discharged employees and exerting what effort he can to reform men who have habits which interfere with their service to the company. He supplies literature to employees on request and carries in his pockets a supply of tickets good for a loaf of bread or a cup of coffee at bakeries and restaurants along the line. These tickets are for persons in straitened circumstances."

Western Union Telegraph.

The annual meeting of the Western Union Telegraph Co. was held in New York City, Oct. 12. James Stillman was elected a director in the place of R. G. Rolston, deceased. The gross earnings for the year to June 30 last were $23,915,733, an increase of $1,276,874 over the preceding year. Net earnings increased $357,948. There is a decrease of 767 miles in the length of pole lines, a number of highway lines having been abandoned and the wires transferred to railroad lines.

Harbor Improvements at Montevideo.

In a recent consular report Albert W. Swalm, United States Consul at Montevideo, informs the Government of contemplated improvements in the harbor of that city. Bids will be asked from firms in this country as well as from European contractors. An appropriation of $15,400,000 is provided for, to be in bonds, interest to be 6 per cent. per annum, payable quarterly, either at Montevideo or in some European financial centre. As one of the items of the redemption fund, a tax of 2½ per cent. is to be levied on all importations. All the new port dues are also set aside for the bonds and interest. A financial commission is to take charge of the matter, and within a year the bonds are to be on the local and general markets. The scheme adopted is that known as the Kummer-Guerrard plan. The lowest water is to leave 7½ meters (24.52 ft.) in the canal. A careening dock 200 meters (656.17 ft.) long, and of corresponding width, with 8 meters (26.24 ft.) of water on the lowest beams, is also provided for.

Iron in Russia During 1897.

The increase in the amount of iron produced in Russia during 1897 occasioned much surprise among the iron-producing countries of Europe. Ten years ago Russia occupied the seventh place among the iron-producing countries; now she has advanced to the fifth place, her output during 1897 exceeding that of Austria-Hungary and Belgium. During the year 1897 Russia produced 2,043,000 tons, an increase of 270,000 tons, or 15 per cent. During the past 10 years Russia has tripled her production of iron. While the quality of iron produced in Russia is inferior, it is largely due to the primitive methods used in its manufacture, the slow development of the iron industry and the limited number of miles of railroad in Russia; but this is being remedied, and the indications now point to a largely increased activity in the production of iron during the coming year. While the iron industry has made considerable progress in Southern Russia within a few years, the development in the Ural Mountain region has made rapid strides, the production increasing 108,000 tons during 1897. The building of the Trans-Siberian Railroad has caused new enterprises to spring up in that region, which is now the scene of extraordinary activity. Increased activity is reported in the Kerch peninsula, in the Black Sea; furnaces have been erected and are now running their full capacity. A new foundry with six furnaces is in the course of construction at Rostoff, on the River Don. Metallurgical enterprises are being established in Northern Russia for the utilization of the iron ores of the Olonetsk region. While no great plants, such as now exist in Southern Russia, can be established in this part of the Empire, the number of small plants will materially increase the total amount of iron produced in Russia. This large increase in the production of iron in Russia caused a decrease in the import of pig iron, while that of manufactured iron and steel increased.

The principal railroads in Russia are owned by the Government, and the others expect to be brought under the same control in the near future, which leaves the Government the only purchaser of rails. The Russian mills are protected by a duty of $27.90 per ton. Early in the year steel rails were held at $40 per ton; but the Minister of Finance fixed prices at $37.64 maximum per ton, all sales of Russian rails being made at that figure. The effect of this order has been to decrease the production of steel rails and increase that of wrought iron, the output of the latter for 1898 being estimated at 360,000 tons.

It is predicted that Moscow will soon become the first market in Russia for the sale of metals, as it is now the leading manufacturing center, and imports large quantities of iron from other countries, being unable to secure all that is needed in Russia.

Channel Corrections at Stockton.

Sealed proposals will be received for channel corrections on the San Joaquin River and Stockton Channel, San Joaquin County, Cal. The San Joaquin River work embraces channel corrections at proposed cut-offs Nos. 3 and 4. Bids will be received at the office of the Auditing Board, 61 Capitol Building, Sacramento, Cal., until Nov. 2. Each bid must be accompanied by a certified check for $2,000, payable to the order of H. J. Corcoran, Chairman of the Auditing Board to the Commissioner of Public Works for California.

Dry Dock for the Cramps.

It is said that the William Cramp & Sons Ship & Engine Building Company will soon begin work on a large dry dock, but whether it will be at Beach street or at Greenwich Point, where the company owns a large tract of land, cannot be ascertained. The dock at the shipyard is too small to accommodate many vessels needing repairs, and the business of the company makes another basin a necessity. The dimensions of the new dock have not been made public.

Production of Pig Iron and of Rolled Iron and Steel in Canada in 1897.

The Bulletin of the American Iron and Steel Association for Oct. 15 gives the following figures: The production of pig iron in the Dominion of Canada for the year 1897 amounted to 53,796 gross tons, a decrease of 6,234 tons as compared with 1896, but an increase over 1895 of 15,967. The Bessemer pig included in the figures for the total was 11,550 tons, all made by one company. No spiegeleisen or ferro-manganese was produced in Canada in 1897. On Dec. 31, 1897, there were eight completed blast furnaces in the Dominion, of which four were in blast and four out of blast on the date named.

The production of basic and acid open-hearth steel ingots in 1897 was 18,400 gross tons, against 16,000 tons in 1896 and 17,000 tons in 1895. Of the total in 1897 a little less than three-fifths was made by the acid process. The production of open-hearth steel rails in 1897 amounted to 500 tons, against 600 tons in 1896; structural shapes, 4,300 tons, against 4,540 tons in 1896. The total number of rolling mills and steel works in Canada on Dec. 31, 1897, was 17. Of this number at least three were idle during the whole of 1897.

Atchison Lands.

J. E. Frost, Land Commissioner of the Atchison, Topeka & Santa Fe, has resigned, for the purpose of devoting his time to the management and sale of large tracts of land which he has recently acquired. Some of these lands were formerly owned by the Atchison, and were disposed of to Mr. Frost. The railroad company's land grant had been closed out prior to the reorganization, and its land department will now be discontinued.

Neat Trainmen.

The New York, New Haven & Hartford, in its circular giving instructions concerning the winter uniforms to be worn by its passenger trainmen and station agents, tells the men that they must be neat in appearance, with clean clothes, white shirts, white collars, black necktie, and black shoes, well polished. Tan shoes must not be worn with uniform while on duty. Badge and buttons must be kept bright. Uniform coat must be kept buttoned, and standard cap, obtained from the storekeeper, must be worn straight, neither tipped sideways nor backward. Baggagemasters may wear jumpers and overalls if made of small blue and white checked denim, cut to fit loosely. One newspaper account says that uniforms must be worn by trainmasters, but this, we are told, is an error.

Stamped Steel Ceilings in England.

Consul Halstead writes from Birmingham: "It is my belief that a sale could be developed here for American ornamental stamped steel ceilings and kindred stampings, now used so generally in the United States as a substitute for plaster for ceilings and walls. If some American manufacturer of these steel stampings will send me catalogues and approximate prices I will place them in the hands of an enterprising English architect, who has agreed to seek an opportunity for experimental use."

LOCOMOTIVE BUILDING.

The Norfolk & Western has sent out specifications for 10 locomotives.

The Maine Central is considering buying a few new engines, probably two or three.

The Brooks Locomotive Works have received an order to build 10 engines for the Buffalo, Rochester & Pittsburgh.

The Chesapeake Beach has ordered one of the 8-wheel passenger engines referred to in our issue of Sept. 2 from the Pittsburgh Locomotive & Car Works.

The Lake Shore & Michigan Southern is preparing specifications for 45 locomotives, which are to be of a larger type than any heretofore used by the road.

The Atchison, Topeka & Santa Fe has ordered 35 engines, five 10-wheelers, with 19½ in. x 28 in. cylinders (for passenger service) and five consolida-

tions with 21 in. x 28 in. cylinders, from the Dickson Locomotive Works, and 25 consolidations from the Baldwin Lomocotive Works. These locomotives will be practically duplicates of others of the same classes built for the road by the Dickson Locomotive Works. An abstract of the specifications for the consolidation engines was given in this column, Oct. 14.

CAR BUILDING.

The St. Charles Car Co. is building 20 cars for freight service for the United Verde & Pacific.

The Delaware & Hudson Canal Co. has placed the order for the 300 coal cars referred to last week, with the Buffalo Car Mfg. Co.

It is reported that the Toledo, St. Louis & Kansas City is considering buying some new freight cars. We have no official information.

The Cape Fear & Yadkin Valley has placed an order for 50 box cars and 50 flat cars, of 60,000 lbs. capacity, with the Ensign Mfg. Co.

The Chesapeake Beach has placed an order for 32 of the passenger cars referred to in our issue of Sept. 2, with the Ohio Falls Car Mfg. Co.

The Union Pacific, Denver & Gulf has ordered 50 refrigerator cars from the Wells & French Co., and 200 coal cars from the St. Charles Car Co.

According to report, the Chicago, Burlington & Quincy has increased the order for cars referred to in our issue of Sept. 16 by at least 200 cars.

The Iowa Central has ordered 250 more box cars from the Terre Haute Car Mfg. Co., to be built from the same specifications as those noted in our issue of Aug. 19.

Rhodes, Curry & Co. of Amherst, N. S., have just built six coal cars of 30,000 lbs. capacity, for the Crow's Nest Pass, an extension of the Canadian Pacific in British Columbia.

The order placed by the Columbus, Sandusky & Hocking with the Ohio Falls Car Mfg. Co., and previously referred to in these columns, called for 300 gondola and 100 box cars, which are now being built. They are of 60,000 lbs. capacity, and have Buckeye trucks, Westinghouse brakes and Buckeye couplers.

The 75 refrigerator cars ordered by the G. H. Hammond Co. from the Michigan-Peninsular Car Co. and mentioned in our issue of last week, will be 34 ft. long, of 50,000 lbs. capacity, and have Westinghouse air brakes, and automatic couplers. They are to be delivered on or before Jan. 1.

The Intercolonial of Canada will award a contract for six passenger coaches, six sleeping cars and three dining cars, to the Wagner Palace Car Co. The road will also build, at its own shops, 14 second-class sleeping cars, known as tourist cars. The report that the Wagner Palace Car Co. is building 24 cars for the Intercolonial was in error.

The 2,000 cars ordered by the Pennsylvania, and referred to in our issue of Sept. 30, will be low side, drop end gondolas (Class Gi.), of 80,000 lbs. capacity and 33 ft. 7 in. long, outside of body (35 ft. 7. in. frame), and 8 ft. 11 in. wide. One thousand will have Schoen pressed steel bolsters and all the cars will be furnished with Westinghouse brakes, Janney couplers, steel axles and P. RR. standard trucks.

The orders recently placed by the Columbus, Hocking Valley & Toledo were as follows: 150 gondola, 100 flat, 50 box, and 50 side dump cars, Ensign Mfg. Co., for delivery Nov. 1; 100 gondolas, Barney & Smith Car Co., and 250 gondolas, Michigan-Peninsular Car Co., for delivery this month. Reference to these contracts was made in our issues of Sept. 23 and 30. The gondola cars will be of 60,000 lbs. capacity, weigh 26,000 lbs., and measure 35 ft. long and 9 ft. wide. The specifications call for iron or steel axles, wooden bolsters, hickory brake beams, gray iron brake shoes, Westinghouse air brakes, M. C. B. brasses (make left to builder), Buckeye couplers, Hoey draft rigging, 350 with gray iron and 150 with malleable iron journal boxes, with Drexel lids, and diamond trucks. No special make of springs is specified, but either Detroit or Scott springs will be used. The flat cars will weigh 22,400 lbs., of 60,000 lbs. capacity, and be 36 ft. long and 9 ft. wide. The box cars will be of 60,000 lbs. capacity, weigh 33,800 lbs., and measure 38 ft. 4½ in. long, 9 ft. 1 in. wide and 13 ft. 3 in. high, and the side dump cars will be of the same capacity, weigh 30,400 lbs. and measure 35 ft. 2 in. long, 8 ft. 6 in. wide and 7 ft. 7 in. high. The flat and side dump cars will have steel axles, metal (box cars Bettendorf) bolsters, Sterlingworth brake beams, gray iron brake shoes, Westinghouse air brakes, M. C. B. standard brasses, Buckeye couplers, Hoey draft rigging and Buckeye trucks. In addition to these the box cars will have Security car doors, with Dayton fastenings, McCord journal boxes, Excelsior roofs and diamond trucks.

The Dallas (Tex.) City Street railroad expects to buy six new cars before Jan. 1.

The Chicago & Milwaukee Electric Railway Co. expects to buy four motor and 10 trailer cars during the winter.

The Baltimore (Md.) City Passenger railroad has placed an order for 20 closed cars with the American Car Co.

The Eckington & Soldiers' Home (Washington, D. C.) has contracted with the American Car Co. for 55 cars and with the Laclede Car Co. for 15 cars.

BRIDGE BUILDING.

BOSTON, MASS.—The contract for abutments and a pier for a bridge on Columbia road, Dorchester, and over the New York, New Haven & Hartford tracks was given to D. F. O'Connell, whose bid for the work was $23,000.

It is reported that a bridge will be built across the Neponset River at Milton, to cost about $50,000.

CAMBRIDGE, MASS.—The City Council of Cambridge passed an order appropriating $50,000 toward building the West Boston bridge and one creating a Cambridge bridge loan to run 40 years at 3½ per cent. (See Boston, Feb. 18, p. 128.)

CHICAGO.—On Oct. 14 Commissioner of Public Works McGann ordered the Throop St. and the Ninety-fifth St. bridges closed to traffic on account of their unsafe condition. As the appropriation for bridge repairs for this year is exhausted, and the new appropriation will not be available until Jan. 1, these bridges will remain closed until after that time.

CINCINNATI, O.—The Board of City Affairs has instructed the City Engineer to prepare plans for a viaduct to be built across the tracks of the Cincinnati, Hamilton & Dayton, and the Baltimore & Ohio Southwestern at Harrison avenue. It will be 60 ft. wide, and is estimated to cost about $250,000. The law authorizing the bond issue for this viaduct was passed April 23.

CLEVELAND, O.—It is stated that bids are asked until Nov. 5 for building the substructure piers and approaches for the new bridge over the Cuyahoga River at Center St. Geo. R. Warden, Director of Public Works.

FRESNO, CAL.—It is stated that the Supervisors of Fresno County will shortly ask for bids for building a bridge to be 520 ft. long, including approaches, and to cost about $10,000.

HARTFORD, CONN.—On the proposed extension of the Philadelphia, Reading & New England two bridges will be required. (See Railroad Construction column.)

LONDON, ONT.—E. M. Talbot, County Engineer, is preparing plans for a steel bridge to be built on Giles site over the Thames River, between Delaware and Caradoc.

MAGNOLIA, MISS.—The Commissioners of Pike County will receive bids until Nov. 7 for building a wooden bridge 190 ft. long, near Summit. C. W. Vaught, Clerk.

NASHVILLE, TENN.—Bids will be received by the Board of Public Works and Affairs until Oct. 25, for building the approaches to the Broad St. and Church St. viaducts. The approaches will consist of masonry abutments and steel bents, with creosoted timber floor system. W. M. Leftwich, Jr., City Engineer.

NEWPORT, R. I.—It is reported that the city of Newport will build a bridge over the railroad tracks at Van Zandt's Ave., to cost about $20,000.

NORFOLK, VA.—The City Council has appropriated $5,000 for bridge improvements.

PHILADELPHIA, PA.—The following is a list of bridges for 1898, recommended to be paid for out of the new loan, for which the Survey Committee, Department of Public Works, recommends an appropriation of $600,000:

	Approximate Cost.
1. Retaining walls, abutments and superstructure for Thirty-third Street over P. & R. Ry. and over conecting railway, $220,000 (to complete)	$189,000
2. Lehigh Avenue, under connecting railway	65,000
3. Wyoming avenue, over Frankford Creek	100,000
4. Seventeenth Street, over P., G. & N. RR.	60,000
5. Seventy-first Street, over P., W. & B. RR.	25,000
6. Sedgley Avenue, over Richmond Br. P. & R. Ry.	40,000
7. Allegheny Avenue, under North Penna. RR.	20,000
8. Fifty-seventh Street, over W. C. & Phila. RR.	20,000
9. To commence drawbridge across Schuylkill River at or near the line of Passyunk Avenue	40,000
10. Fifty-second Street, under Penna. RR.	46,000
11. Sixty-sixth Avenue North, over North Penna. RR.	4,000
	$600,000

A list of bridges for 1899, for which the Survey Committee of the Department of Public Works recommends an appropriation of $810,000:

	Approximate Cost.
1. Grays Ferry Bridge over Schuylkill River (to complete)	$100,000
2. Thirty-third Street bridges over P. & R. and connecting Railway (to complete)	40,000
3. Gibson Avenue, under Baltimore & Phila. RR. (City's share)	20,000
4. Graver's Lane, over Chestnut Hill Br. P. & R. RR.	10,000
5. Erie Avenue, over Richmond Br. P. & R. Ry.	75,000
6. Montgomery Avenue, over Connecting Ry.	45,000
7. "D" Street, over Connecting Ry.	20,000
8. Glenwood Avenue, over Richmond Br. P. & R. Ry.	45,000
9. Allegheny Avenue, under Connecting Ry.	50,000
10. Armat Street, under Gtn. & Ch. H. Br. P. & R. Ry. (two bridges)	40,000
11. Dauphin Street, under Connecting Ry.	40,000
12. Frankford Avenue, over Frankford Creek (two bridges)	80,000
13. Large Street, under Frankford Br. P. & R. Ry. (half cost)	9,000
14. Sixtieth Street, over P., W. & B. RR.	28,000
15. Byberry Road, over Creek in 35th Ward.	3,000
16. Passyunk Avenue, over Schuylkill River (continued)	114,000
17. Hunting Park Avenue, over Richmond Br. P. & R. Ry. (half cost)	31,000
18. Bridge on line of Rhawn Street, over Pennypack Creek	60,000
	$810,000

ST. PAUL, MINN.—The Commissioners of Ramsey County recently passed a resolution authorizing the Minneapolis, St. Paul & Sault Ste. Marie to build a bridge at Rise St. The bridge will have two spans 45 ft. wide. It will cost about $9,500.

SAGINAW, MICH.—The Flint & Pere Marquette has asked permission of the Board of Supervisors of Saginaw County to build a bridge over the Littabawassee River.

SPOKANE, WASH.—The Commissioners of Spokane County will shortly call for bids for building an iron bridge over the Spokane River. It will cost about $5,000. Henry Treede, Chairman County Commissioners.

VALENCIA, KAN.—A bridge will be built across the Kansas River about a mile west of Valencia, to cost about $14,000. Silver Lake Township will vote $5,400, Dover Township $4,800, and Shawnee County will subcsribe the balance of the money necessary.

WICHITA, KAN.—City Engineer H. H. Hendershot, at the request of Councilman J. G. Smith, has made sketches of a viaduct projected to be built, of either stone or steel, from Fourth avenue to Washington avenue. It will be about 1,500 ft. long, and will cost from $65,000 to $95,000.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Great Northern.—Quarterly, preferred, 1¾ per cent., payable Nov. 1.

Rio Grande West.—Quarterly, preferred, ¾ per cent., payable Nov. 5.

St. Paul, Minn. & Man.—Quarterly, guaranteed, 1½ per cent., payable Nov. 1.

Albany, N. Y., Ry.—Quarterly, 1½ per cent., payable Nov. 1.

Brooklyn City.—Quarterly, 2½ per cent., payable Oct. 15.

Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

American Society of Civil Engineers.—Meets at the house of the Society, 220 West Fifty-seventh street, New York, on the first and third Wednesdays in each month at 8 p. m.

Association of Engineers of Virginia.—Holds its formal meetings on the third Wednesday of each month from September to May, inclusive, at 710 Terry Building, Roanoke, at 5 p. m.

Association of Railway Superintendents of Bridges and Buildings.—Eighth annual convention, Murphy's Hotel, Richmond, Va., from Oct. 18 to 20.

Boston Society of Civil Engineers.—Meets at 715 Tremont Temple, Boston, on the third Wednesday in each month at 7.30 p. m.

Canadian Society of Civil Engineers.—Meets at its rooms, 112 Mansfield street, Montreal, P. Q., every alternate Thursday at 8 p. m.

Central Railway Club.—Meets at the Hotel Iroquois, Buffalo, N. Y., on the second Friday of January, March, May, September and November, at 2 p. m.

Chicago Electrical Association.—Meets at Room 1737, Monadnock Building, Chicago, on the first and third Fridays of each month at 8 p. m. J. R. Cravath, secretary.

Civil Engineers' Club of Cleveland.—Meets in the Case Library Building, Cleveland, O., on the second Tuesday in each month at 8 p. m. Semi-monthly meetings are held on the fourth Tuesday of each month.

Civil Engineers' Society of St. Paul.—Meets on the first Monday of each month except June, July, August and September.

Denver Society of Civil Engineers.—Meets at 3 Jacobson Block, Denver, Col., on the second Tuesday of each month except during July and August.

Engineers' Club of Cincinnati.—Meets at the rooms of the Literary Club, 25 East Eighth street, on the third Thursday of each month, excepting July and August, at 7.30 p. m.

Engineers' Club of Columbus (O.).—Meets at 12½ North High street on the first and third Saturdays from September to June.

Engineers' Club of Minneapolis.—Meets in the Public Library Building, Minneapolis, Minn., on the first Thursday in each month.

Engineers' Club of Philadelphia.—Meets at the house of the Club, 1122 Girard street, Philadelphia, on the first and third Saturdays of each month at 8 p. m., except during July and August.

Engineers' Club of St. Louis.—Meets in the Missouri Historical Society Building, corner Sixteenth street and Lucas place, St. Louis, on the first and third Wednesdays in each month.

Engineers' Society of Western New York.—Holds regular meetings on the first Monday in each month, except in the months of July and August, at the Buffalo Library Building.

Engineers' Society of Western Pennsylvania.—Meets at 410 Penn avenue, Pittsburg, Pa., on the third Tuesday in each month at 7.30 p. m.

Locomotive Foremen's Club.—Meets every second Tuesday in the clubroom of the Correspondence School of Locomotive Engineers and Firemen, 335 Dearborn street, Chicago.

Montana Society of Civil Engineers.—Meets at Helena, Mont., on the third Saturday in each month at 7.30 p. m.

New England Railroad Club.—Meets at Pierce Hall, Copley Square, Boston, Mass., on the second Tuesday of each month.

New York Railroad Club.—Meets at 12 West Thirty-first street, New York City, on the third Thursday in each month at 8 p. m., excepting June, July and August.

Northwest Railway Club.—Meets on the first Tuesday after the second Monday in each month at 8 p. m., the place of meeting alternating between the West Hotel, Minneapolis, and the Ryan Hotel, St. Paul.

Northwestern Track and Bridge Association.—Meets at the St. Paul Union Station on the Friday following the second Wednesday of March, June, September and December, at 2.30 p. m.

St. Louis Railway Club.—Holds its regular meeting on the second Friday of each month at 3 p. m.

Southern and Southwestern Railway Club.—Meets at the Kimball House, Atlanta, Ga., on the second Thursday in January, April, August and November.

Technical Society of the Pacific Coast.—Meets at its rooms in the Academy of Sciences Building, 819 Market street, San Francisco, Cal., on the first Friday in each month, at 8 p. m.

Western Foundrymen's Association.—Meets in the Great Northern Hotel, Chicago, on the third Wednesday of each month. A. Sorge, Jr., 1533 Marquette Building, Chicago, is secretary.

Western Railway Club.—Meets in Chicago on the Third Tuesday of each month at 2 p. m.

Western Society of Engineers.—Meets in its rooms on the first Wednesday of each month at 8 p. m., to hear reports and for the reading and discussion of papers. The headquarters at the Society are at 1736-1739 Monadnock Block, Chicago.

The Civil Engineers' Club of Cleveland.

The regular monthly meeting was held in Case Library, Oct. 11, at 8 p. m., President Osborn in the chair; present, 16 members and 4 visitors. The discussion upon the proposed amendment to the constitution, changing the name of the Club, was resumed. Mr. Parmley finally moved as an amendment to strike out the proposed term, "The Cleveland Society of Engineers" and insert "The Cleveland Engineering Society." This was seconded by Dr. Langley, and after discussion was put to vote and carried. The petition as amended was ordered to letter ballot.

Mr. Arthur A. Skeels, member of the Club, presented some "Notes and Observations on a Recent Trip Through Mexico." His description of the numerous cities he visited was illustrated by a large number of fine photographs taken by himself. These views represented street scenes, cathedrals, towers, aqueducts, waterfalls, volcanoes, plantations, etc. He described Monterey as being a most ancient and foreign looking city, with houses of adobe. Its water supply is taken from local wells, and its sanitation is exceedingly bad. It, however, enjoys electric lights and street cars hauled by mules, tandem.

The Castle of Chapultepec, a very beautiful and imposing structure, is the official residence of President Dias. At Tlaxcala is seen the tower of the church built by Cortez, the oldest in Mexico. Some of the natural scenery is Swisslike in its grandeur and beauty, particularly in the vicinity of Orizaba.

At Queretaro there is a long stone viaduct of considerable height, carrying the water supply to the city, where beautiful fountains are constantly playing.

Guadalajara is the most beautiful town in Mexico; the theatre and church are magnificent edifices, and not far away are the falls of Juanacatlan, the largest waterfalls in Mexico. These falls are utilized for power, and the production of electric lights which are used in the city.

The Detroit Engineering Society.

The regular monthly meeting of the society will be held at the Hotel Ste. Claire, Friday, Oct. 21. A paper on "Coal Handling Machinery" will be read by C. W. Russell, Superintendent Russell Wheel and Foundry Co.

Switchmen's Union.

The Switchmen's Union of North America held a convention at Cleveland, O., last week. M. K. Conlin, of Kansas City, was elected Grand Master.

Canadian Ticket Agents.

The Canadian Ticket Agents' Association held a convention at Ottawa, Ont., last week. The President chosen for the ensuing year is W. E. Rispin, Chatham, Ont. The convention next year will be held at Winnipeg.

Society of Naval Architects and Marine Engineers.

The sixth general meeting of the Society of Naval Architects and Marine Engineers will take place in New York City at 10.30 a. m., Thursday, Nov. 10, 1898. Through the courtesy of the President and Managers of the American Society of Mechanical Engineers, the meetings will be held in the auditorium of No. 12 West 31st street, the sessions continuing through Thursday and Friday, Nov. 10 and 11. There will be a banquet at Delmonico's at 7 p. m., Friday, Nov. 11. A list of the papers to be read at this meeting follows:

Thursday, Nov. 10.

1. Torpedo Boat Destroyers for Sea Service, with Special Reference to the Conditions that Prevail on the Pacific Coast By G. W. Dickie, Esq., Member.
2. The Standard Navy Boats. By Arthur B. Cassidy, Esq., Member.
3. Bilge Keels and Rolling Experiments, U. S. S. Oregon. By Asst. Naval Constructor Lawrence Spear, U. S. N., Member.
4. Steam Economy Test of a Unique Form of Feed Pump. By F. M. Wheeler, Esq., Member.
5. Portable Pneumatic Riveters in Shipbuilding. By W. I. Babcock, Esq., Member.

Topical discussion of the following questions:

1st. The utility of Torpedo Boats, and has the Submarine Boat a place?

2d. In what respects have the recent Naval Engagements affected opinion as to the value and best distribution of armor for warships?

Friday, Nov. 11.

6. The Steam Yacht as a Naval Auxiliary. By William P. Stephens, Esq., Associate.
7. Designs of the New Vessels for the U. S. Navy. By Chief Constructor Philip Hichborn, U. S. N., Vice-President.
8. Methods of Testing Water-tight Bulkheads in U. S. Navy. By Asst. Naval Constructor H. G. Smith, U. S. N., Associate.
9. Tests of the Strength of a Longitudinal Bulkhead Separating Two Engine Rooms. By Naval Constructor J. J. Woodward, U. S. N., Member.
10. An Electrically Operated 150-Ton Revolving Derrick. By Walter A. Post, Esq., Associate.
11. Stability of a Battleship under Damaged Conditions. By Prof. Cecil H. Peabody, Member.

Topical discussions of the following questions:

1st. Under the circumstances of the Blockade at Santiago, which was the more economical method of maintaining the boilers in readiness for immediate action—banking the fires or keeping them spread, but very thin?

2d. Can you give any data as to the cost in coal of maintaining the engines and boilers in readiness for immediate service?

3d. What, if any, difficulty was there in maintaining the supply of fresh water for the boilers; and, if there was any difficulty, to what do you attribute it?

4th. As a result of experience on the Blockade, what particular points about the machinery were most likely to give trouble, and what could be done to prevent a recurrence of such trouble?

Western Railway Club.

At the meeting of the Club, held Oct. 18, in the Auditorium Hotel, Chicago, the paper of the evening was by Mr. Peter H. Peck, entitled, "The Adoption of a Standard Knuckle." The topical discussion was "What Is the Best Disposition to Be Made of the Exhaust from the Air Pump?" A committee appointed to consider the subject decided that it is best not to have a banquet this year.

Western Society of Engineers.

The excursion of the Western Society of Engineers to the Omaha Exposition left Chicago Friday evening, Oct. 14, the party consisting in all of about forty. Saturday and Sunday were spent at the Exposition, and the party on the return arrived in Chicago Monday morning.

On Saturday afternoon, Oct. 15, a special train of four cars furnished by the Pennsylvania Lines took a party of 158 members of the Western Society of Engineers to inspect the track elevation work of that road, the Lake Shore & Michigan Southern, and the Chicago, Rock Island & Pacific. The train left the Union Station at 1:15 o'clock and was run to a point below South Chicago, where it was turned on a "Y." The track elevation commences at South Park avenue, and on the return the first stop was made at State street, where the elevation of the tracks of the Pittsburgh, Ft. Wayne & Chicago is nearly completed, while that of the Lake Shore & Michigan Southern and the Chicago, Rock Island & Pacific is well under way; a new union station for the joint use of these three roads is being built on the south side of Sixty-third street. A new freight station has already been completed by the Pittsburgh, Ft. Wayne & Chicago at State street, and one of the notable features of the work of this road is that stone ballast is placed between the ties and the bridge floors to reduce the noise of passing trains. This has so far not been done by any of the other Chicago roads. The next stop was made at Garfield Boulevard, which bridge is completed, and north of which the tracks descend to meet the old grade near Fifty-first street. The train was left near Sixteenth street and the extensive work at the Sixteenth street crossing was inspected. At this point all the tracks have now been brought to the new grades, the retaining walls and abutments have been built, and there remains to replace the temporary bridges with the steel work. The steel for the viaduct in Clark street was in process of erection on the day of the excursion, and it is expected that this will be in place by Oct. 19.

PERSONAL

—Lyman A. Jackson, Chief Clerk to R. Evans, Purchasing Agent of the Pittsburgh & Lake Erie, died Oct. 13. He was 50 years of age.

—Mr. D. W. Janowitz, Division Passenger Agent of the Wisconsin Central at Baltimore, has gone to Porto Rico in the traffic interests of his road.

—Mr. Horace Wiley Soper, head of the American Foundry & Furnace Co., died Oct. 11, after a long illness, at his home in Chicago, aged 56. Mr. Soper had been a resident of that city for a number of years and was well known in the iron business.

—Mr. Thomas A. Frazer, Superintendent of the Wells & French Co., Chicago, shot and killed himself at his home in that city on Oct. 13. He had been ill for about a week, during which he was under the care of a physician. Mr. Frazer was 50 years old and had been connected with the Wells & French Co. for several years.

—Mr. Frank C. Doran, Engineer and General Road Master of the Chicago & Western Indiana and the Belt Railway of Chicago, Died Oct. 15, at his home in Chicago, leaving a widow and two daughters. Mr. Doran was born in Milton, Ind., Jan. 2, 1849, and was educated as a civil engineer at Earlham College, Richmond, Ind. As Chief Engineer of the Chicago & Western Indiana, Mr. Doran was connected with the work of elevating the tracks at the Sixteenth Street Crossing, Chicago. He was a member of the American Society of Civil Engineers.

—Mr. William W. Boyington, who is said to have been the first architect to settle in Chicago, died at his home at Highland Park, a suburb of that city, on Oct. 16, aged 80 years. Mr. Boyington was born at Southwick, Mass., July 22, 1818, and after leaving school and learning the carpenter's trade, he studied architecture. In 1853 he went to Chicago, and since that time has designed many prominent buildings there and in other cities, including many churches and numerous educational and public buildings, depots and hotels. Well known among the examples of his work in Chicago are the water tower of the North Side pumping station, the Chicago & Northwestern Depot, the Sherman and Grand Pacific hotels, the old University of Chicago and the Illinois State Building at the World's Fair. Many buildings designed by him were destroyed by the Chicago fire and afterward rebuilt on the same plans. Mr. Boyington also designed the Windsor Hotel in Montreal, the Union Depot in Cincinnati, and churches in Philadelphia, Indianapolis and other places.

—Mr. John Lundie has removed from Chicago to New York to act as Consulting Electrical Engineer for the Brooklyn Elevated Railroad, and he is now preparing the preliminary plans for changing the motive power of the Fifth and Lexington avenue lines in Brooklyn from steam to electricity. After graduating at the University of Edinburgh in 1880 Mr. Lundie went to the Pacific Coast and was connected with the engineering department of the Columbia River Division of the Oregon Railroad & Navigation Co. He came to Chicago in 1884, and in 1890 opened a consulting engineering office in that city, devoting himself largely to railroad matters, and particularly to the question of the substitution of electricity on steam roads. Much of his work along this line has been done for the Illinois Central, and in the preparation of his report to the officers of that road, which was presented about a year ago, he went carefully and thoroughly into the question of motive power, giving a critical review of the merits of different systems. Mr. Lundie's office while in New York will be with Dr. Louis Duncan, at 71 Broadway.

—Mr. John Malcolm Forbes, Chairman of the Board of Directors of the Chicago, Burlington & Quincy, died at Milton, Mass., Oct. 14, in his 86th year. Mr. Forbes had been at the head of the Burlington road and its controlled lines for more than a generation, having first become a Director in 1857. He was also for many years at the head of the Michigan Central and other "Joy roads" (of which James F. Joy of Detroit was the active local head). Although thus a prominent railroad man for nearly fifty years, it was more as a financier and capitalist than as an active, administrative officer; and Mr. Forbes will be chiefly remembered for his high personal character, his public spirit and the wise use he made of his great wealth. In early life he was a merchant engaged in foreign trade. He was a millionaire before he became interested in railroads, and at his death he was said to be the richest man in New England. He devoted his energies and his money largely to public service. He was Chairman of the Republican National Committee in the days of President Lincoln, and was the friend and counselor of the President and of Governor Andrew of Massachusetts during the War of the Rebellion.

ELECTIONS AND APPOINTMENTS.

Atchison, Topeka & Santa Fe.—G. L. Zellers has been appointed Chief Train Dispatcher at Wellington, Kan., in place of R. Clements, resigned.

J. E. Frost, Land Commissioner at Topeka, Kan., has resigned. It is understood the land department is abolished.

S. H. Stinson has been appointed Traveling Freight and Passenger Agent, Salt Lake City.

Baltimore & Ohio.—C. H. White has been appointed Commercial Agent, with headquarters at Parkersburg, W. Va.

Baltimore & Ohio Southwestern.—W. O. Paxton, General Agent at Cincinnati, has resigned. He is succeeded by A. Fries, heretofore Chief Clerk in the General Freight Department. Mr. Fries will be succeeded by John R. Rowland, who has been Freight Claim Agent at Cincinnati. That office will be abolished. Peter L. Dudley has been appointed Assistant Chief Clerk.

Chas. E. Fish, Jr., has been appointed Freight Agent at Cincinnati, succeeding John L. Korn, deceased.

Boston & Maine.—At the annual meeting, held at Lawrence, Mass., Oct. 12, Alexander Cochrane was elected a director to fill one of the vacancies. It was decided to fix the number of directors at 14, a decrease of one.

Central of Georgia.—At the annual meeting, held in Savannah, Ga., T. M. Cunningham of Savannah was elected a Director in place of Patrick Walsh.

Chattanooga Southern.—Edith Jarnagin has been appointed Chief Train Dispatcher at Chattanooga, Tenn.

Chicago, Burlington & Quincy.—John L. Gardner has been elected Chairman of the Board of Directors in the place of J. M. Forbes, deceased. J. M. Forbes, Jr., was elected a director, filling the vacancy caused by his father's death.

Chicago Great Western.—A. W. Chapman, heretofore Chief Train Dispatcher of the Chicago, St. Paul, Minneapolis & Omaha at St. Paul, Minn., has been appointed Dispatcher of the C. G. W. at Dubuque, Ia. H. C. Van Meter has been appointed Train Dispatcher at St. Paul.

Chicago, Milwaukee & St. Paul.—B. H. O'Meara, Division Freight and Passenger Agent, Cedar Rapids, Ia., has resigned. He is succeeded by W. L. Kennelly, heretofore Traveling Passenger Agent at La Crosse, Wis.

E. B. Bridges has had his title changed from that of Division Passenger and Freight Agent at Kansas City to General Southern Agent.

Chicago, Peoria & St. Louis.—Chas. D. Moyer, Treasurer for the Receivers, G. E. Kimball and S. P. Wheeler, at Springfield, Ill., has resigned. Mr. Moyer has also resigned as Treasurer for the St. Louis, Chicago & St. Paul. These two roads are operated in very close connection and have practically the same set of officers.

Chicago, St. Paul, Minneapolis & Omaha.—B. L. Morse, heretofore Train Dispatcher at Baraboo, Wis., of the Chicago & Northwestern, has been appointed Chief Train Dispatcher of the C., S. P., M. & O. at St. Paul, succeeding A. W. Chapman, resigned.

Cincinnati, Hamilton & Dayton.—At the annual meeting held in Cincinnati, Geo. P. Benjamin of New York was elected a director in place of Fellows Davis, also of New York.

Cincinnati, New Orleans & Texas Pacific.—A. J. Chapman, heretofore Agent at Jackson, Miss., has been appointed Commercial Agent in charge of Texas territory, with headquarters at Dallas, Tex.

Cincinnati, Portsmouth & Virginia.—At the annual meeting held in Cincinnati Oct. 12, Judge A. C. Thompson was elected a Director, succeeding P. Langdon. Judge Thompson has been heretofore General Counsel of the company, but on his recent appointment to the bench he resigned his position as counsel.

Colorado Midland.—W. H. Donnell has been appointed General Agent, with headquarters at Salt Lake City.

Chas. H. Glein has been appointed Traveling Freight and Passenger Agent of the Portland territory, with headquarters at Portland, Ore.

Detroit & Lima Northern.—Ralph C. Cables has been appointed General Passenger Agent, with headquarters at Detroit, Mich.

Flint & Pere Marquette.—W. W. Ashald, heretofore Trainmaster of the St. Louis & San Francisco at Springfield, Mo., has been appointed Chief Train Dispatcher and Superintendent of Telegraph, with headquarters at Saginaw, Mich.

Galeton, South Branch & Germania.—The officers of this company, referred to in the Construction column are: President, C. H. Rexford; Vice-President, J. L. Snyder; Secretary and Auditor, C. H. Rexford, Jr.; Treasurer, J. R. Dengle; General Manager and Purchasing Agent, W. A. Rexford. The main office is at Galeton, Pa.

Great Northern.—L. H. Gray, General Agent Freight Department at Seattle, Wash., has resigned. (See White Pass & Yukon.)

Grand Trunk.—Jas. Maines, Chief Clerk in the Superintendent's office at Detroit, will resign Nov. 1. Victor Cooper, Trainmaster at the same point, will also resign.

Illinois Central.—L. S. McCabe has been appointed Train Dispatcher at Kankakee, Ill., succeeding W. H. Ball, resigned.

Intercolonial.—The office of General Superintendent has been created, and J. E. Price, heretofore District Superintendent at Truro, Nova Scotia, has been appointed to the newly created position. Mr. Price will have his headquarters at Moncton, N. B. The position of District Superintendent, made vacant by Mr. Price, will be filled by G. M. Jarvis, with headquarters at Truro. H. Fleming, District Train Dispatcher at Moncton, has been appointed Chief Train Dispatcher, with headquarters at the same point. W. H. Olive has been appointed Traveling Freight Agent, with headquarters at Montreal, Que.

The title of Wm. Robinson, lately transferred to Toronto, Ont., from St. Johns, N. B., is that of General Traveling Agent. (Oct. 14, p. 749.)

Kanawha Dispatch.—J. A. Werne has been appointed Agent, with headquarters at Memphis, Tenn.; C. T. Divine has been appointed Traveling Freight Agent, with headquarters at the same point.

W. O. Paxton, heretofore General Agent of the Baltimore & Ohio Southwestern at Cincinnati, has been appointed Agent of this freight line at Cincinnati, O.

Lackawanna.—T. J. McGeog has been appointed Agent at Memphis.

Lehigh Valley.—J. W. Lattig, with headquarters at Easton, Pa., has resigned as Superintendent of Telegraphs and Signals to go into private business.

Louisville & Nashville.—A. R. Davant, formerly Traveling Freight Agent of the Southern at Memphis, has been appointed Commercial Agent, with headquarters at the same point, succeeding T. G. McClellan, resigned. J. T. Crutchfield, formerly Eastern Freight Agent at New York, has been appointed General Agent at Chicago, succeeding J. M. Fitzgerald, promoted.

Macon & Birmingham.—J. A. Streyer has been appointed Traveling Freight and Passenger Agent, with headquarters at Macon, Ga., succeeding M. J. Chancey, resigned.

Mexican Central.—O. F. Spindler, in addition to his duties as General Agent of the Mexican Gulf Steamship Co., has been appointed Commercial Agent of the M. C., with headquarters at New Orleans.

J. H. Feehan has been appointed Trainmaster of the San Luis, Mex., Division, with headquarters at San Luis Potosi, succeeding J. H. Greenwell, resigned. (Sept. 30, p. 714.)

Michigan Central.—Joseph H. Hall has had his title changed from Michigan Passenger Agent to District Passenger Agent, with office at Detroit. His territory has been enlarged.

Minneapolis & St. Louis.—At the annual meeting, held in Minneapolis, Minn., on Oct. 4, Wm. Strauss was elected a Director to fill the vacancy caused by the resignation of C. S. Mellen.

Minneapolis, St. Paul & Sault Ste. Marie.—The Train Dispatching offices at Harvey, N. D., and Minneapolis have been consolidated at Enderlin, N. D. Geo. S. Baxter has been appointed Chief Dispatcher.

S. W. Harrison, heretofore Superintendent of Transportation of the Wisconsin & Michigan, has been appointed First Train Dispatcher at Enderlin, N. D.

Nashville, Chattanooga & St. Louis.—George Doran, Soliciting Agent at Cincinnati, O., has resigned. He is succeeded by George McCarren. (Oct. 7, p. 731.)

Northern Alabama.—The position of N. R. Adriance, who recently resigned as Superintendent and Traffic Manager, is temporarily filled by T. D. Rhodes, assistant to the General Manager. The headquarters are at Sheffield, Ala.

Ohio Central.—C. L. France has been appointed City Passenger Agent at Columbus, O. He succeeds C. W. Mordiff.

Omaha Bridge & Terminal.—The officers of this company, referred to in the Construction column, are: President, John Lowder Welsh, Philadelphia, Pa.; Vice-President and General Manager, John R. Webster, Omaha; Treasurer, Henry W. Yates, Omaha; Secretary, J. H. Daniels, Omaha; Superintendent, J. P. Nichols, Omaha; Chief Engineer, J. A. L. Waddell, Kansas City.

Pennsylvania Company.—R. B. Rossington, heretofore Freight Agent at Fort Wayne, has been appointed Traveling Freight Claim Agent, with headquarters in Pittsburgh, Pa.

J. B. Boyer has been appointed Chief Motive Power Clerk, with headquarters at Altoona,. Pa., succeeding B. F. Custer.

Peoria, Decatur & Evansville.—At the annual meeting, held in Peoria, Ill., on Oct. 4, Francis N. Weeks of New York was elected a Director.

Richmond, Nicholasville, Irvin & Beattyville.—The general offices of this company, now located at Versailles, Ky., will be removed to Richmond, Ky.

St. Louis & San Francisco.—The Train Dispatcher's force at Newburg, Mo., has been transferred to St. Louis, and the force at Neodesha, Kan., has been moved to Monett, Mo.

Santa Fe, Prescott & Phoenix.—H. C. Storey, heretofore Chief Train Dispatcher, has been appointed Trainmaster with office at Prescott, A. T.

Southern.—At the fifth annual meeting of the stockholders, held at Richmond, Va., Oct. 16, the board was increased from 9 to 11 members, the two additional directors being Adrian Iselin, Jr., of A. Iselin & Co., and James T. Woodward, President of the Hanover National Bank, New York City.

M. C. Adams has been appointed Traveling Freight Agent, with headquarters at Memphis, and C. McKellar has been appointed Soliciting Agent, with headquarters at the same point.

B. C. Fechtig, Chief Train Dispatcher at Columbia, S. C., has resigned. W. L. Connolly, Train Dispatcher at Asheville, N. C., has resigned. He is succeeded by Geo. Goodwin.

Southern Pacific.—Chas. Fay, heretofore Chief Clerk in the General Freight Department, has been appointed Assistant General Freight Agent, with headquarters at New Orleans, La.

Sylvania.—L. H. Hilton, President and General Manager, and G. M. Hill, Treasurer, with headquarters at Sylvania, Ga., have resigned. P. D. Daffin has been elected President and Treasurer, with headquarters at Savannah, Ga.

Washington & Columbia River.—E. Ringer has been appointed Chief Train Dispatcher, with office at Hunt's Junction, Wash.

West Virginia Central & Pittsburgh.—A. C. Cohill has been appointed Supervisor in place of J. W. Eberhart, resigned, with headquarters at Elkins, W. Va. John S. Chambers has been appointed Superintendent of Motive Power, with office at Elkins, W. Va. He succeeds J. B. Turner.

White Pass & Yukon.—L. H. Gray, heretofore General Agent in the Freight Department of the Great Northern at Seattle, Wash., has been appointed Traffic Manager, with headquarters at Skaguay, Alaska.

Wisconsin & Michigan.—S. W. Harrison, Superintendent of Transportation, with headquarters at Peshtigo, Wis., has resigned.

RAILROAD CONSTRUCTION,
New Incorporations, Surveys, Etc.

ALABAMA GREAT SOUTHERN.—In General Manager Frank S. Gannon's annual report, it is stated that 21.89 miles of new 75-lb. rail was laid, and there is now on hand ready for laying on the main track 2,501 tons of new 75-lb. rail, which will be laid between Birmingham and Tannehill, Ala. During the year 149,605 cross ties were placed. About four miles of new side track was built and two miles was taken up, the net increase in the length of the side tracks being 1.87 miles, of which 1.57 miles are new tracks to industrial plants. There was 924 ft. of trestle rebuilt and 300 ft. of old trestle work filled in. At the end of the fiscal year 162 miles of the main line was ballasted with slag. Sufficient slag for ballasting 14.25 miles is laid along the track and ready for distribution.

ATCHISON, TOPEKA & SANTA FE.—An official is reported to have said that about 300 miles of new rail will be laid on the main line this year. Ballasting the main line is also being carried on, and the work of improving terminals in Southern California will continue. Track between Coffeeville, Kan., and Cherryvale is being relaid with new rails and new ties. The track is also being relaid between Topeka and Kilmer, Kan.

ATLANTA & WEST POINT.—Final location is in progress and building will begin in from 30 to 60 days on the proposed belt line around Atlanta, Ga. (Sept. 30, p. 714.) The line will begin at a point near the western limits and run to a point near the eastern city limits, approximately six miles long and located at an average distance of about one-quarter of a mile from the city limits. It will connect the Georgia and the Seaboard Air Line at the eastern terminus, and the Central of Georgia and the Atlanta & West Point at the western terminus. Contract for grading, bridges, etc., will be let in from 30 to 60 days. It is to be a double track road of standard gage, and the country traversed is not especially difficult. The maximum grade is 1 per cent., and the maximum curve 6°. There will be three iron trestles and one tunnel 350 ft. long. The rest of the waterways will be masonry culverts. The rails used will be re-lays taken from the main line. No additional rolling stock is required. (Official.)

BAKERSFIELD & LOS ANGELES.—W. B. Storey, Jr., Chief Engineer of the San Francisco & San Joaquin Valley at San Francisco, has begun reconnoissance of the Tejon Pass, preparatory to a preliminary survey for the line from Bakersfield to Los Angeles. (Sept. 23, p. 696.)

BELLINGTON BAY & BRITISH COLUMBIA.—Surveys are reported in progress for a branch to run west to the Mount Baker Mining District, Wash.

BOYER VALLEY.—This company was incorporated in Iowa Oct. 6, to build a line from the Chicago & Northwestern at or near Sac City, to run southwest about 25 miles to Denison, and from a point at or near Stockholm to run through Monona and Harrison Counties southwest 75 miles to a point on the Sioux City & Pacific to Movale. The capital stock is $10,000, and the bonds are not to exceed $16,000 per mile. The incorporators are Marvin Hughitt, Chicago, a director in the Chicago & Northwestern; M. M. Kirkman, J. M. Whitman, J. B. Redfield and H. R. McCullough. (See C. & N. W. below.)

BUFFALO & SUSQUEHANNA.—New and heavier rails are being laid along the line, according to report, and four iron bridges are being built.

CANADIAN PACIFIC.—The Crow's Nest Pass extension is completed from Lethbridge, N. W. T., west to Kuskanook on Kootenay Lake, B. C. (Sept. 30, p. 714.)

The Pacific Division is to be extended from Vancouver, B. C., to Laggan. It is also proposed to extend the line from Vancouver to Caribou.

CANADIAN ROADS.—Messrs. D. B. Vincent of Butte, Mont., and W. T. Thompson of Midway, B. C., will make application to the next British Columbia Legislature to build a road from a point at or near Midway, thence west through the valley of Kettle River to its junction with the West Fork, thence up the West Fork to a point at or near the mouth of Beaver Creek.

CHESAPEAKE BEACH.—Twelve miles of this line is in operation from Chesapeake Junction, D. C., on the Baltimore & Ohio, to Upper Marlborough. From Marlborough to Chesapeake Bay, 18 miles, the line is under contract to be completed Jan. 1 next. The authorized capital stock is $1,000,000, and the company has made a mortgage to the Continental Trust Co. as trustee, to secure $1,000,000 of 5 per cent. 25-year bonds. (Aug. 12, p. 568.)

CHICAGO & NORTHWESTERN.—The report that contracts are let for grading the extension from Denison, Ia., northeast about 80 miles to Algona, appears premature, since an official of the company writes that nothing has been determined as yet regrading the construction of such a line. (Oct. 14, p. 750.)

COAST RAILWAY OF NOVA SCOTIA.—Thirty-one miles is completed and in operation between Yarmouth, N. S., and East Pubnico, and 20 miles additional is under construction and every effort is being made to finish this section before the end of the season. The masonry is in, the grading well advanced and ties on the ground. A survey of the entire line along the coast to Halifax is completed, plans are being prepared and estimates will be made to ascertain the cost of the entire line. In all probability work will then be begun at the Halifax end, as well as the western end of the present work. The contractors for 20 miles now building are the Nova Scotia Development Co. of Philadelphia; G. Martin Brill, President, and Geo. A. Fletcher, Treasurer. (March 11, p. 188; Oct. 7, p. 732.) L. H. Wheaton, Yarmouth, N. S., is Chief Engineer and Superintendent. (Official.)

COLUMBUS, FULTON & NORTHERN.—This company, which received its charter from the State of Mississippi Nov. 29, 1897, is to build a line from Columbus, Miss., to run north on the east side of the Tombigbee River through Aberdeen, Smithville, Fulton and Hamburg, Miss., and Savannah, Tenn., to Lexington on the Nashville, Chattanooga & St. Louis, 175 miles. The grade will not exceed 1½ per cent., and on the South Division not over 1 per cent. There will be two iron bridges, each 30 ft., and 60-lb. rails will be used. Work will be begun as soon as the securities are floated. (Jan. 28, p. 70.) Newman Cayce of Columbus, Miss., is President. (Official.)

CUBAN ROADS.—General Wood, at Santiago de Cuba, is reported to have received requests from two companies for railroad concessions, one from Santiago to Manzanillo, and the other from Santiago to Havana. General Alger is reported to be preparing a bill to present to Congress asking an appropriation to build a connecting road in Cuba between the two ends of the island, in accordance with the report of Colonel Hecker. (Oct. 14, p. 750.)

DELAWARE.—Switch connection is made with the New York, Ontario & Western on this line, now building from Delhi, N. Y., southeast 15 miles to Andes and Bovina Center. Work is being pushed with vigor along the line. One of the abuttments of the Little Delaware bridge is practically completed and work is progressing on each of the others. Strong & Totten, 32 Liberty St., New York, have the general contract. Henry Davis of Delhi is President. (Sept. 23, p. 696.)

DETROIT & MACKINAC.—Report that this company is grading a branch line from Prescott, Mich., north to Rose City (Sept. 30, p. 714.) is officially denied.

FLINT & PERE MARQUETTE.—This company has asked the Saginaw County Supervisors the privilege of building a bridge over the Tittawassee River in Saginaw Township for a proposed extension from Saginaw, Mich., to St. Charles.

GALETON, SOUTH BRANCH & GERMANIA.—This company has been incorporated to build a line from a point near Gaines, Pa., to run across Pine Creek and along Painter Run to Leetonia. The officers are given under Elections and Appointments.

GALVESTON, HOUSTON & KANSAS CITY.—This company is reported formed to take over the property of the Galveston, La Porte & Houston, recently sold (Oct. 14, p. 751), and to extend it north to Kansas City, Mo. The present road runs from Galveston via La Porte to Houston, Tex., 52.6 miles. L. J. Smith of Kansas City, who bought the G., L. P. & H., is interested in the project.

GEORGIA PINE.—The citizens of Arlington, Ga., on Oct. 11, celebrated the completion of the Georgia Pine into Arlington. (Oct. 14, p. 750.)

GREAT EASTERN.—This company has been incorporated in North Carolina, with a capital stock of $650,000, to build a line from Goldsboro on the Southern, to run east 137 miles through Wayne, Greene, Pitt, Beaufort and Hyde Counties to a deep water terminus on Pamlico Sound, probably Swan's Quarter. The incorporators are: J. D. McCormick and I. N. Allen, of New York; J. W. Lynch, of Kinston; J. H. McCleary, of Suffolk; George W. Suggs and Josiah Exum, of Snow Hill.

INDIANA, ILLINOIS & IOWA.—A letter from an official of this company states that there is no truth whatever in the report that this company will extend its line from Streator, Ill., west to some town upon the Mississippi. (Sept. 16, p. 678.)

LEHIGH VALLEY.—The lessees of the farms south of Chapel Ave., Jersey City, received notice to vacate the lands before Nov. 1 for the extensions of the L. V. tracks and the building of a freight yard in that district.

LOUISVILLE & NASHVILLE.—Thirty-five miles of 80-lb. rails are being laid on the Short Line. The road is also being ballasted and laid with new ties.

MANSFIELD SHORT LINE.—This company proposes to extend its line east, perhaps as far as Wooster, O. It is now building from Shelby, O., northwest via Mansfield to Lucas, about 20 miles. C. W. French of Mansfield is President. (April 22, p. 300.)

MEXICAN CENTRAL.—Mr. Lewis Kingman, Chief Engineer, is in Boston to consult with the President of the road with respect to the extension of the recently bought Michoacan & Pacific from Yurecaro, on the M. C., to run southeast about 200 km. (124 miles), through Uruapan and Taretan to Ario. Grading is finished for 30 km., and surveys made to Ario. The new concession to the company from the Mexican Government provides that the company shall complete at least 60 km. (37.3 miles) by July 30, 1900, and 120 km. within the three years following, and the whole line by July 30, 1905. The company receives a subsidy of $6,000 for each kilometer, the limit being 190 km. The capital invested is to be exempt from taxes for 15 years. The company is also planning to build from La Vegas about 30 miles west of Guadalajara, to run south via Zapotlan to Colina, where connection is made with the Mexican National Construction Company's line to Manzanillo. This line has recenely been bought by the M. C. This extension is practically over the same route as the recent concession made to Señor Ignacio Borda of Mexico City. (Mexican Roads, Sept. 23, p. 696.)

MEXICAN ROADS.—The Mexican Government is reported to have granted a concession for a standard gage road, 150 km. (93 miles) maximum length, to the Inquaran Copper Mining Company, to connect its mines in the State of Michoacan with the Bay of Zituataneza, on the Pacific coast.

A concession has recently been granted by the Federal Government to Messrs. Ignacio Canseco, Miguel Maria and Manuel Maria Castillo for a road to run through the state of Vera Cruz from Fortin, near Cordoba, north about 25 miles to Huatasco, and perhaps to Coatapec, on the International, about 25 miles more.

MOBILE & BIRMINGHAM.—A new yard is being built at Mobile, Ala., on the east side of St. Joseph St.

NELSON & BEDLINGTON.—Contracts are to be let soon for building the 52 miles of track from Bonner's Ferry, Idaho, on the Northern Pacific, north along the valley of Kootenay River to Kootenay Lake, B. C. From that point steamers will connect with the Kaslo & Slocum, and the whole will form a part of the new Kootenay Railway & Navigation Company's lines. (May 6, p. 332.)

NEW ENGLAND.—Track laying is begun on the Norwich & Worcester extension from Allyn's Point, Conn., south six miles to Groton. The company will lay the track as fast as the grading is completed.

NEW ROADS.—F. M. Lyman, Engineer in charge of the survey for the proposed road of Knight & Sons, Provo City, Utah, reports that preliminary surveys are completed for the line from Strawberry Valley, Utah, west over the Divide into Utah County. The survey demonstrates that a 2 per cent. grade can be obtained. (Sept. 2, p. 639.)

Michigan press dispatches state that the East Jordan Lumber Co. has begun building a railroad from East Jordan, Mich., on the Frederic & Charlevoix, to run south about eight miles, with branches to extensive lumber lands.

The Stevens Lumber Co., according to report, will build a standard gage road from Dyersburg, Tenn.,

on the Illinois Central, to run north 28 miles to Tiptonville on the Mississippi River.

NEW YORK, NEW HAVEN & HARTFORD.—On the Stonington Division, 100-lb. rail is being laid, replacing the present 78-lb. rail. The roadbed is being repaired and the tracks resurfaced. (Official.)

NORTHERN NEBRASKA.—This company was incorporated in Nebraska, Oct. 6, with a capital stock of $360,000, to build a line from Atkinson, Holt County, north to Perry, a new town on the Niobrara River. On the following day the North Nebraska Construction & Developing Company was incorporated, with a capital stock of $50,000. Among the incorporators of the two companies are C. H. Brown, O. G. Wales and O. A. Perry. This is practically over the same route as that of the Nebraska & Northern, now building. (Oct. 7, p. 732.)

NORTHERN PACIFIC.—Rails are laid on the extension from Aberdeen, Wash., to Hoquian, 4.6 miles. (July 1, p. 485.)

OMAHA BRIDGE & TERMINAL.—This company expects to add materially to trackage and to build both freight and passenger stations in the cities of Omaha, Neb., and Council Bluffs, Ia. Most of the work is being done by employees of the company. A small amount of grading at Council Bluffs is let to J. W. Spry, and a steel bridge in Council Bluffs to C. E. H. Campbell. Two small grading contracts are let in Omaha, one to Jackson Bros., and another to Corchoran & Fouke. About 1½ miles of track is laid through the city of Council Bluffs from Broadway south nearly to the city limits, with a branch into the heart of the city at Ninth and Broadway. One steel bridge about 72 ft. long over Indian Creek is completed. The rest of the work is simple, except that there are a good many railroad crossings. The difficulties are in striking the street grades and avoiding expensive buildings. The maximum grade is 1 per cent.; the maximum curve on the main line 10°; on side tracks 18°. One steel bridge 72 ft. long is building. A steel drawbridge over the Mississippi, with 520 ft. draw, has been built for some time. It was opened four times during this summer to let excursion boats pass. The draw is worked by electricity and the company finds that the time from the unlocking to the locking of the bridge again requires from nine to 11 minutes. As a terminal company, it is not expected to acquire rolling stock. The business will be simply to handle cars and equipment of other roads. (Oct. 7, p. 732.) The officers are given under Elections and Appointments. (Official.)

OREGON SHORT LINE.—Grading is completed for the new yard trackage at Kemmerer, Wyo., and the extension of side tracks at Novene, Topaz, Onyx, McCammon, Idaho, and Divide, Ore. A yard at Kemmerer is also being built, while the side tracks at the other stations named have been graded for 70 car sidings.

PECOS VALLEY & NORTHEASTERN.—President Hagerman of Colorado Springs, Col., is reported to have made the statement that his company will extend its line south from Pecos, Tex., to Boquillas, on the Rio Grande River in Brewster County, where connection will be made with a proposed extension of the Mexican Northern. The P. V. & N. E. is building an extension north from Roswell, N. M., to Amarillo, Tex. (Sept. 30, p. 715.)

PERRIS & LAKEVIEW.—This company has been incorporated in California with a capital stock of $80,000, to build a line from Perrin on the Southern California line of the Atchison, Topeka & Santa Fe, to run northeast about 10 miles to Lakeview. The Directors are: W. G. Nevin, G. Holterhoff, Jr., E. Chambers, H. J. Stevers and A. P. McGinniss, all of Los Angeles. This is probably the road noted in this column under New Roads (Sept. 16, p. 679.) Newspaper reports state that grading is begun. It is understood that the Santa Fe is back of the project.

PHILADELPHIA & READING.—The work on the subway in Philadelphia has progressed so rapidly that the first freight train ran through last week. The tunnel is completed as far as Spring Garden St.

PHILADELPHIA, READING & NEW ENGLAND.—The extension of this road from Tariffville, Conn., to Springfield, Mass., will be about 15 miles long, with a maximum grade of less than 1 per cent. and a light curvature. (Oct. 14, p. 750.) The work to be done is not difficult. Two steel bridges will be required, one across the Farmington River, near Tariffville, and the other across the Agawam, near Springfield. The survey was made some years ago and was recently revised. (Official.)

PORTSMOUTH & YORKTOWN.—This company was incorporated in Ohio Oct. 11, with a capital stock of $25,000, to build a line in Scioto County, from Portsmouth to Yorktown. The incorporators are Levi D. York, Adam Buck and Ben. F. Vincent.

RICHMOND, PETERSBURG & CAROLINA.—Rails are reported laid for the entire 20 miles from Petersburg, Va., south to Butterworths. (Sept. 9, p. 656.)

ROCKFORD-KELLYTON.—This company has been incorporated in Alabama with a capital stock of $50,000, to build a line from Kellyton on the Central of Georgia, to run west 15 miles to Rockford. The incorporators are: E. P. Batson, E. V. Jones, H. W. Pond, D. L. McAllister, F. M. Dorsey, John T. Carson and A. D. Bentley.

ROSSFORD & TOLEDO.—This company was incorporated in Ohio Oct. 11, with a capital stock of $10,000, to build a line from the foot of the Maumee Rapids to the Cincinnati, Hamilton & Dayton. The incorporators are: Edward Ford, Rathbun Fuller, M. R. Pepper, W. P. Tyler, Thomas A. Taylor and F. H. Tanner.

SEABOARD AIR LINE.—Extension from Loganville, Ga., northwest 10.5 miles to Lawrenceville, is completed. (Sept. 30, p. 715.)

SHERMAN, SHREVEPORT & SOUTHERN.—A siding is being built to a private industry at McKinney, Tex.

SOUTHERN.—The contract is let to Smith, Carson & Smith, Birmingham, Ala., for grading a second side track at the Sloss Iron & Steel Co.'s mines at Pine Ridge, Ala.

The second survey for the proposed extension from Stevenson, Ala., northeast to Chattanooga, Tenn., is reported completed. This makes the distance about 35 miles. (Sept. 16, p. 679.)

SOUTHERN PACIFIC.—Track is laid for the entire distance on the extension of the Visalia branch from Visalia, Cal., southeast 9.436 miles to Exeter. Grant Bros. of San Francisco have the contract. (Sept. 16, p. 679.)

SOUTHPORT TERMINAL.—J. J. Dougherty, local manager of this company, incorporated Sept. 13 to build a line from Wilmington, N. C., south to Southport, states that permanent organization will be effected during the present month. The right of way over the Carolina, Tennessee & Ohio, under consideration, will not be utilized and a new route has been decided on. (Sept. 23, p. 697.)

TOLEDO & NORTHWESTERN.—S. A. Williams of Albion, Mich., an official of this company, is authority for the statement that the company will build as far as Hanover, Mich., this fall, where connection will be made with the Detroit, Toledo & Milwaukee. The line was recently completed from Albion, Mich., north to Charlotte, and is graded from Albion south to Hanover. (June 24, p. 467.)

WELLINGTON & POWELLSVILLE.—This company has completed its line from Ahoskia, N. C., south to Windsor, and it was opened for business Sept. 15. (Oct. 7, p. 732.)

Electric Railroad Construction.

BEAUMONT, TEX.—Mr. J. F. Keith, one of the projectors, writes us in regard to the electric railroad project in Beaumont, that the people interested are directors and principal stockholders in the Beaumont Ice, Light & Refrigerating Co. They have an electric plant and believe that they are in a good position to carry on the work, but not being railroad men, would prefer to induce some one else with capital and experience to build the road, the lighting company to furnish power. If they are not successful in interesting outside capital, the Beaumont men will build the road. (Sept. 29, p. 697.)

BURLINGTON, VT.—Local papers state that C. W. Blakeslee of New Haven, Conn., has been given the contract for completing the Burlington & Hinesburg RR. The road was projected as a steam road, and work was begun several years ago, but it will be completed as an electric road. It will be 12 miles long. F. O. Sinclair of Burlington is interested.

CHILLICOTHE, MO.—J. H. Hardeback, of Kankakee, Ill., is promoting a project to build an electric railroad between Chillicothe and Trenton, about 20 miles; interested with him are W. B. Leech, C. A. Loomis, B. B. Gill and others of Chillicothe, and T. M. Harber and Judge George Hall, of Trenton.

CINCINNATI, O.—The Cincinnati, Milford & Goshen Ry. Co. is incorporated, with a capital stock of $10,000, to build an electric or other railroad between Linwood in Cincinnati and Goshen, Clearmont County, running along the Cincinnati, Columbus and Wooster turnpike, through the village of Milford. The incorporators are: Frank A. Goodwin, Frederick E. Niederhelman, William C. Compton, Lennox C. Goodwin and S. W. Kittering.

DARTMOUTH, N. S.—The Canadian Minister of Railways and Canals, Hon. A. J. Blair, has received an offer through Messrs. Starr & Sons, representing themselves and others, to operate the Dartmouth, N. S., branch of the Intercolonial by electricity, instead of steam.

HAMILTON, ONT.—The Hamilton Radial Electric Ry., it is reported, is building an extension to Port Nelson, about 10 miles.

HELENA, MONT.—Mr. H. L. Walker, Secretary of the Helena Power & Light Co., writes that the company has under consideration an extension of the electric railroad to East Helena, 4½ miles. New machinery is being set up to accommodate the power which is to be received from the company that has built the Missouri River dam at Canyon Ferry, about 18 miles from Helena. (Oct. 7, p. 733.)

JOHNSTOWN, PA.—The Johnstown & Somerset Traction Co. was recently incorporated to build a trolley line from Johnstown to Windber. The incorporators are Charles S. Price, Morris L. Woolf, David Barry, Herbert H. Weaver and Fred Krebs, all of Johnstown. Morris L. Woolf is President, and Edward A. Barry Secretary and Treasurer. Rights of way have been secured through the Townships of Stonycreek and Richland, in Cambria County, and Paint Township, in Somerset County. (Sept. 23, p. 697.)

LOGANSPORT, IND.—The Commissioners of Carroll County granted a franchise for the right of way for the proposed Logansport & Burlington Electric RR. The franchise was granted to the Business Men's Association of Logansport, which has undertaken to organize a company. Some time ago, it is reported, this Association secured the franchise for an electric road from Logansport to Rochester, in Fulton County, and later a franchise was granted from Rochester to Winona, in Kosciusko County.

MT. VERNON, N. Y.—The Common Council of Mt. Vernon, at a meeting held Oct. 14, received reports from its committees appointed to consider applications for street car franchises from the Union RR. of New York, and the New York, West Chester & Connecticut RR. The committees recommended that the franchises be given the Union RR. for a term of 50 years. The report was not adopted. The representatives of the New York, West Chester & Connecticut Co. offer four-cent fares as an inducement for franchises.

MYERSVILLE, MD.—The Myersville & Catoctin Electric RR., 5½ miles long, is completed to Middletown, where it connects with the Frederick & Middletown Ry. The stockholders of the two roads are practically the same. They will both do freight and passenger business. (March 25, Sept. 15; pp. 225, 523.)

NEW YORK, N. Y.—It is reported that the Third Avenue RR. Co. has signed contracts as follows for the electrical equipment of the system: With the Westinghouse-Walker Co., about $4,500,000; with the Johnson Co., for about 15,000 tons of 110-lb. rails; with the Pennsylvania Iron Co., for about $3,500,000 of castings, and with the National Conduit & Cable Co., for the conduits, amounting to about $1,500,000. It was also said that part of the equipment would be available for electric lighting purposes. John Beaver, Treasurer of the Third Avenue Co., is reported to have said that it was not true that any electrical equipment contract with the Westinghouse-Walker Co. had been made as yet, but that the other three contracts mentioned were given out a week or ten days ago by President Elias of the railroad company.

The State Railroad Commissioners on Oct. 18 authorized the Twenty-eighth and Twenty-ninth Street Cross-Town RR. Co. to change its motive power from horses to electric conduit. The entire capital stock of this line is owned by the Metropolitan St. Ry.

PHILMONT, N. Y.—The Columbia Traction Co. is reported incorporated with a capital stock of $100,000, to build a trolley road in Philmont and other parts of Columbia County. The incorporators are Franklin G. Simmons, Wm. C. Allen and Ernest F. Foote of Rutherford, N. J.

PORT ANGELES, WASH.—Work has begun on the Port Angeles & Eastern Electric RR. Wm. Martell and John Lehman are the contractors. (July 29, p. 556.)

ST. LOUIS, MO.—The Councilmen passed the bill giving the Lindell Ry. Co. franchises for extensions on a number of miles of streets. The bill also gives the Lindell Co. permission to acquire by lease or purchase all the various systems now operated by it under different names, and the systems known as the Missouri lines and the Forest Park, Laclede and Fourth street lines. These various franchises are all extended to 1942. The city is to receive by way of remuneration the following: For the years 1899 to 1900, $14,000 annually; from 1901 to 1906, $28,000 annually; from 1906 to 1915, $32,000 annually; from 1915 to 1925, a sum equal to 3 per cent. of the gross earnings; for the next eight years, a sum equal to 3½ per cent.; and for the remaining 10 years, 4 per cent. of the gross earnings annually. (Sept. 16, p. 679.)

UTICA, N. Y.—Mr. I. J. Griffith, one of the projectors, writes in regard to the Sanquoit Valley Electric St. RR. Co.: "We plan to get the franchises in about one month. The proposed route is about 24 miles long, and will connect eight villages with the city of Utica. The company will be in the market for the necessary equipment, power house and other buildings, but does not expect to make any contract until the right of way is all secured and the maps and profiles made, which are expected to be ready in about a month."

GENERAL RAILROAD NEWS.

Railroad Earnings.

Showing the gross and net receipts for the periods ending at the dates named:

August 31.		1898.	1897.	Inc. or Dec.	
Burlington, Cedar Rapids & Northern.					
1 month	Gross	$465,430	$387,538	I.	$67,892
1 "	Net	148,850	118,728	I.	30,122
8 months	Gross	2,687,269	2,550,540	I.	156,729
8 "	Net	818,201	765,495	I.	52,706
Chicago & Eastern Illinois.					
1 month	Gross	$379,354	$300,848	I.	$78,506
1 "	Net	169,538	122,640	I.	46,898
2 months	Gross	700,361	574,724	I.	125,637
2 "	Net	301,166	266,525	I.	74,641
Flint & Pere Marquette.					
1 month	Gross	$274,877	$235,292	I.	$39,585
1 "	Net	80,040	64,431	I.	15,609
8 months	Gross	1,923,376	1,769,097	I.	154,279
8 "	Net	465,084	435,121	I.	29,963
Illinois Central.					
1 month	Gross	$2,371,996	$2,175,681	I.	$196,315
1 "	Net	691,169	569,970	I.	121,199
2 months	Gross	4,424,070	4,159,756	I.	264,314
2 "	Net	1,156,776	1,046,090	I.	110,686
Kansas City, Fort Scott & Memphis.					
1 month	Gross	$409,844	$438,121	D.	$28,277
1 "	Net	131,977	136,440	D.	4,463
2 months	Gross	752,317	808,343	D.	56,026
2 "	Net	237,142	252,426	D.	15,284
Minneapolis, St. Paul & Sault Ste. Marie.					
1 month	Gross	$334,238	$315,073	I.	$19,165
1 "	Net	139,673	121,729	I.	17,944
8 months	Gross	2,460,600	1,237,792	I.	1,222,808
8 "	Net	1,030,391	837,988	I.	192,403
Missouri, Kansas & Texas.					
1 month	Gross	$906,652	$987,769	D.	$81,117
1 "	Net	290,434	324,524	D.	34,090
2 months	Gross	1,659,457	1,795,687	D.	136,230
2 "	Net	411,892	518,899	D.	107,007
Philadelphia & Erie.					
1 month	Gross	$461,485	$450,230	I.	$11,255
1 "	Net	188,666	150,698	I.	37,968
8 months	Gross	2,714,223	2,705,675	I.	8,548
8 "	Net	757,561	732,612	I.	24,949
Rio Grande Western.					
1 month	Gross	$272,963	$284,938	D.	$11,975
1 "	Net	86,304	104,024	D.	17,718
2 months	Gross	544,770	591,735	D.	46,965
2 "	Net	172,963	241,100	D.	68,137

September 30.		1898.	1897.	Inc. or Dec.	
Illinois Central.					
1 month	Gross	$2,318,769	$2,346,202	D.	$27,433
Nashville, Chattanooga & St. Louis.					
1 month	Gross	$528,178	$486,651	I.	$41,527
1 "	Net	203,646	180,748	I.	22,898
3 months	Gross	1,603,641	1,457,647	I.	145,994
3 "	Net	633,500	541,617	I.	91,883
Rio Grande Western.					
1 month	Gross	$292,500	$297,900	D.	$5,400

ATCHISON, TOPEKA & SANTA FE.—It is officially announced that negotiations have been substantially completed by the Atchison for the purchase of the San Francisco & San Joaquin Valley road, under an option covering a controlling amount of the stock of the latter. The transaction will be submitted to the Atchison stockholders for ratification at the annual meeting in December. It has been intended to build a short connecting link between Bakersfield and the present line of the Atchison at Mojave, Cal., or some point in that vicinity, but present indications are that this will not be necessary, as the Atchison is negotiating, with every prospect of success, for a satisfactory trackage contract under which it will use the Southern Pacific tracks between Mojave and Bakersfield. The San Francisco & San Joaquin Valley extends from Bakersfield in Central California northward 235 miles to Stockton on the San Joaquin River, where connection is made with San Francisco about 60 miles by water. An extension westward from Stockton toward San Francisco is now under construction. The Atchison thus takes

the principal step toward securing a line through to San Francisco.

BALTIMORE & OHIO.—Press reports to the effect that Col. Henry A. Dupont has sold a controlling interest of the Wilmington & Northern to the receivers of the B. & O. is officially denied by Receiver John K. Cowen.

Holders of the various securities of the Central Ohio, the Sandusky, Mansfield & Newark, the Columbus & Cincinnati Midland, the Newark, Somerset & Straitsville, the Pittsburgh Junction and the Pittsburgh Junction Terminal Co. are notified that, in accordance with an agreement recently published (Oct. 7, p. 733), these securities must be deposited with the Mercantile Trust Co., New York, on or before Nov. 1, after which date no deposits may be accepted, except upon conditions prescribed by the syndicate.

CHICAGO, FORT MADISON & DES MOINES.—W. I. Babb has been appointed by the Circuit Court of the United States, Southern District of Iowa, Eastern Division, Special Commissioner in the case of the American Loan & Trust Co. vs. this railroad, to take an account and ascertain the amount of bonds and unpaid interest, together with the holders of the same. He notifies the holders of bonds or interest coupons to appear before him at 99 Washington street, Chicago, at 10 a. m., Oct. 26, to make proof of the holdings. The C., F. M. & D. M. went into the hands of a receiver July 28 last.

CINCINNATI, NEW ORLEANS & TEXAS PACIFIC.—Judge Taft of the United States Circuit Court at Cincinnati, O., has instructed Receiver Felton to apply the $90,000 surplus on hand for the fiscal year ending June 30 last to the liquidation of debts against the stockholders. This road went into the hands of receivers March 18, 1893. (May 13, p. 350.)

COLORADO VALLEY.—This company, which is building a line from Sweetwater, Tex., southeast toward San Antonio and Austin, has been placed in the hands of Mr. Sloan of the banking firm of Trammell & Co., Sweetwater, as receiver. It is intended to build the line as far as San Angelo.

CUMBERLAND & OHIO.—Master Commissioner Cook, under order of the court, will offer the Northern Division of this road for sale on Nov. 14. The upset price is $150,000. (Oct. 7, p. 733.)

GUNPOWDER VALLEY.—Henry Stockbridge, Jr., Receiver, has filed a petition in the courts at Baltimore, Md., asking that the road be sold, and the court has passed an order directing the sale. The line runs from Hoffman, Md., to Roller and Hoffmanville, three miles, and went into the hands of the Receiver Jan. 6, 1894. Mr. Stockbridge states that the expenditures for the past year were $3,800 in excess of the receipts.

INDIANA & LAKE MICHIGAN.—The date of sale of this road is fixed at Nov. 10, following the decree of June 22 last. (June 24, p. 468.)

MANITOBA & NORTHWESTERN.—A. M. Nanton has had his receivership extended over the entire road, succeeding H. Montague Allen of Montreal in the receivership of the western portion. (Oct. 14, p. 752.)

OHIO SOUTHERN.—This road was sold at foreclosure at Lima, O., Oct. 15, by Special Master John T. Adams of Waverly, to Judge Judson Harmon of Cincinnati for $2,000,000, the upset price. Judge Harmon represents the first mortgage bondholders' committee. (Sept. 30, p. 716.)

PENNSYLVANIA.—Kuhn, Loeb & Co. have bought a new series of $3,000,000 3½% equipment trust bonds, redeemable in 10 yearly instalments of $300,- each.

PITTSBURGH & WESTERN.—The Second Mortgage Committee, of which Alvin W. Krech of 120 Broadway, New York, is Secretary, has effected a sale of the entire $2,000,000 of bonds of their holdings to Simon Borg & Co., New York, at a price which will net certificate holders 72½. (July 22, p. 540.)

RICHMOND, NICHOLASVILLE, IRVIN & BEATTYVILLE.—This property, which was sold Oct. 6 (Oct. 14, p. 752), has been acquired by a syndicate composed of Geo. P. Magann and Alexander Fraser, dealers in railroad supplies in Toronto, Can.; Ernest J. Fawke of Liverpool, Eng., and certain Richmond, Ky., capitalists. Mr. Fawke and other English capitalists recently bought 250,000 acres of coal and timber lands in Perry County, Kentucky, and the railroad will be extended through to these lands.

SEABOARD AIR LINE.—J. Southgate Lemon, Chairman of the Board of Stockholders of the Seaboard & Roanoke, has appointed Chas. H. Krumbharr, Philadelphia, and Lloyd L. Jackson and Decourcey W. Thom of Baltimore, a committee to investigate the charges of mismanagement preferred by Thos. F. Ryan of New York, one of the large stockholders of the company.

STATE LINE & SULLIVAN.—On Dec. 9 the stockholders will vote on a proposition to increase indebtedness.

TENNESSEE COAL, IRON & RAILROAD COMPANY.—At the meeting of the stockholders held at Tracy City, Tenn., approval was given to a proposed agreement whereby this company is to receive $100,000 of first mortgage 6 per cent. bonds, and $440,000 of 6 per cent. preferred stock of the Alabama Steel & Ship Building Co. The stockholders also approve of the agreement between the company and Messrs. Moore & Schley, whereunder these bonds and stock of the Alabama Co. are to be transferred to certain syndicate subscribers in exchange for cash to be provided under the agreement for building the works of the Steel Company. The syndicate, therefore, offers on or after Oct. 17, to receive from the railroad company the Alabama stock and bonds on the basis of $1,000 for one $1,000 bond, and $400 of preferred stock. Twenty per cent. of each accepted subscription is to be paid upon the acceptance of the subscription, and subsequent payments are to be made at not exceeding 10 per cent. per month thereafter. (July 15, p. 523.)

UNION DEPOT COMPANY OF SPOKANE FALLS.—Master in Chancery W. J. C. Wakefield will offer this property at public sale Nov. 12, under order of the Federal Court of Sept. 19. The upset price is $250,000. This company was incorporated July 9, 1889, to build terminals at Spokane Falls, to be jointly used by the Washington & Idaho Line of the Union Pacific and the Seattle, Lake Shore & Eastern. The capital stock was limited to $500,000, of which one-half was issued to each company. The company issued $400,000 first mortgage 5% gold bonds, July 1, 1919, and of these $300,000 was bought by the Union Pacific. Default was made in interest payments on Jan. 2, 1893, and suit was instituted in the Federal Court. A Receiver was appointed Sept. 1, 1894. The property is now used jointly uider lease by the Oregon R.R. & Navigation Co. and the Great Northern.

UNION PACIFIC.—The receivers will offer at public sale at the New York Real Estate salesroom, 111 Broadway, New York, on Oct. 26, at 12 noon, securities as follows: Stock interest of the U. P. in the Boise City Ry. & Terminal Co., $22,900; claim and account in the same company, $71,676.27, excluding interest, upset price of the two, $85,123.49; first mortgage bonds of the U. P. Coal Co., $50,000; certain rental claims of the Oregon Short Line & Utah Northern and its Receivers against the Montana Union, upset price $280,985.02. Bidders at the sale must deposit not less than 25% of the sums bid. The rest of the purchase money must be paid within five days after the sale. (Sept. 16, p. 680.)

UNION PACIFIC, CENTRAL BRANCH.—Holders of first mortgage bonds and coupons of the Atchison & Pike's Peak are notified that Hiram P. Dillon, Special Master, is prepared to pay the proportion of the amount due upon the same upon presentation at his office in the Central National Bank, Topeka, Kan., on or before Oct. 29. (Sept. 22, p. 540.)

WHITE PASS & YUKON.—The issue in London, Eng., of £250,000 securities having proved so successful, they will be made a first charge on the First Division of the line from Skaguay, Alaska, over the White Pass to Lake Bennett, N. W. T., about 50 miles. The rate of interest is 6 per cent., which the contractors guarantee for two years. The line is now operated as far as the top of the Pass. (Oct. 7, p. 732.)

Electric Railroad News.

MONTREAL, QUE.—The sale of the Montreal Park and Island Ry., advertised to take place Sept. 22, was stopped by a number of parties having claims against the road.

PHILADELPHIA, PA.—At a meeting of the Directors of the Fairmount Park Transportation Co., held Oct. 14, President James Rawle and Vice President John W. Henderson resigned their positions as officers and Directors. Charles A. Porter was elected President and Robert Foerderer was elected a Director.

SAGINAW, MICH.—Homer Loring, representing the bondholders of the Union St. Ry. Co., who has been receiver of the two local organizations the past year, has bid in the properties for the newly consolidated company at $307,500. The companies will be reorganized under the control of the Boston bondholders.

ST. LOUIS, MO.—Judge Wood, in the Circuit Court of St. Louis, recently ordered the sale of the People's RR. to satisfy claims of the third mortgage bondholders. The date of the sale, it seems, has not been set, but it will probably be not later than Jan. 1. The Central Traction Co., it is said, will be a bidder against the bondholders for the property, John H. Overall, its attorney, having recently bought in the Fourth Street & Arsenal at a foreclosure sale, and that line will be made a part of the Traction Co.'s system.

WASHINGTON, D. C.—Mr. Charles J. Bell, President of the American Security & Trust Co., Trustee of the mortgage of the Belt Ry. Co., announced that the railroad will be offered at auction Nov. 15.

WEBB CITY, MO.—The stock of the Southwest Missouri Electric Ry. was recently sold to Harrisburg, Pa., men and a new Board of Directors elected, as follows: A. H. Rogers, of Joplin, Mo.; W. W. Calhoon and J. F. Harrison, of Carthage, Mo.; Felton Bent, of Philadelphia, and E. Z. Wallower, A. G. Knisely, E. C. Felton, E. S. Herman, H. L. Hershey, John E. Fox and W. J. Calder, of Harrisburg, Pa. A. H. Rogers was elected President.

TRAFFIC.

Traffic Notes.

A new order has been issued by the Boston & Maine to the effect that all drummers will be forbidden to open or show their goods in station baggage rooms.

The freight vessels of the Southern Pacific from New York are temporarily landing at Sabine Pass, Tex., instead of New Orleans, on account of the yellow fever quarantine.

The demand in Europe for grain, both wheat and corn, has lately been very heavy, over three million bushels being sold in New York on a single day last week. On Oct. 13 vessels contracted to carry grain to Cork for orders at 4s. 3d. per quarter, and a few days later a very large quantity of wheat for Antwerp was contracted for at 6½d. a bushel.

The recent order of the Texas Railroad Commission reducing cotton rates four cents per 100 lbs. and compress rates two cents, will be vigorously fought by the railroads and the compress managers. They will claim that rates are now at the very lowest reasonable basis, and that to handle this year's cotton crop at the reduced rates would be ruinous to the railroads.

Investigation of Secret Rates.

Upon statements made by Chairman Campbell, of the Southwestern Bureau, a freight association composed of roads extending from St. Louis, Kansas City and other points to Texas, and of water and rail lines from eastern seaports to Texas, the Interstate Commerce Commission will make an investigation of alleged violations of the Interstate Commerce Act claimed to result from secret rate cutting and unjust discriminations by the receivers of the Baltimore & Ohio and by the Baltimore & Ohio Southwestern on freight from Philadelphia, Baltimore and Cincinnati to East St. Louis and Chicago, and destined to points in Texas and other states west of the Mississippi. The investigation relates to shipments carried since August 1.

The Central Interchangeable Mileage Ticket.

During the thirteen months to Oct. 1, 152,786 interchangeable mileage books of the Central Passenger Association were sold and less than one-half of 1 per cent. were used by others than the original purchasers. The Chicago Inter Ocean says: "In the majority of cases where it was discovered that somebody not the original purchaser had used the book, investigation showed that it was an unintentional error on the part of firms employing traveling salesmen, and not an attempt to deprive the railroads of any revenue to which they were entitled.

"Scalpers have simply quit trying to handle the ticket, for in every case where they did they lost the rebate of $10 and the railroads obtained the full tariff rate of 3 cents a mile. An Indianapolis broker once thought he had discovered how to manipulate the tickets and bought 10 of them, but his scheme was detected in each instance, and it cost him just $100, the sum of the rebates which he expected to collect when all the mileage was used. That particular broker is now engaged in other business, having come to the conclusion that scalping does not pay in Central Passenger Association territory."

Quarantines Against Yellow Fever.

The following from a Texas paper is now more than a week old, but as most of the published news about the yellow fever situation, as affecting passenger travel, has been vague and unsatisfactory, the reader may be interested in an authentic statement:

The public has become so confused as to quarantine regulations and the running of trains that the General Passenger Department of the Southern Pacific has issued the following circular of information: "Alabama and Florida have quarantined against all yellow fever infected districts, and passengers passing through New Orleans will not be allowed to disembark at points in those states. This regulation does not prohibit passengers passing through New Orleans or other infected points from going to points beyond the borders of the states named. Mississippi has quarantined against all yellow fever infected points and no passengers from or through points infected will be permitted to leave trains at any point in the state, nor will passengers be permitted to transfer within the state from one train to another. All persons from non-infected points must be provided with health certificates before they will be permitted to enter the state of Mississippi.

"Louisiana has quarantined against all points in following parishes [here follow 29 names of parishes]. No tickets must be sold from any point in the parishes named to points outside of the parish limit, unless the point of origin and destination are in two adjoining parishes against which the state has declared quarantine. The towns of Burke [and 11 others] require that passengers from any point must exhibit health certificates before they will be permitted to disembark from trains at these stations. No tickets should be sold to these points unless passenger exhibits health certificate.

"Lake Charles requires passengers from points east and north of Calcasieu parish to hold health certificates. Texas has quarantined against all yellow fever infected points. Memphis, Tenn., has quarantined against the world, and no tickets should be sold to that point. This does not prohibit the sale of tickets through Memphis via New Orleans and Illinois Central Railroad. Tickets must not be sold via Memphis except over the Illinois Central, as lines entering Memphis from the west have discontinued all train service into that point. The authorities of the city of Memphis will permit citizens of Memphis to return home on presentation of proper health certificate issued at the starting point, and on authority to be obtained in writing from Dr. Heber Jones, President of the Memphis Board of Health.

"Illinois.—Passengers from Mississippi and Louisiana will be required by authorities of Illinois to exhibit health certificates before they will be permitted to stop at points within the state."

The circular goes on to give the numbers of trains that are still running.

Reports of new cases of yellow fever continue to be reported from many places in Mississippi and Louisiana, but there are very few deaths. At Jackson the weather has been a little cooler, but there is no frost as yet.

Chicago Traffic Matters.

Chicago, Oct. 17, 1898.

President Stickney of the Chicago Great Western still declines to allow his road to be represented at any of the meetings of the Western Trunk Line Committee until certain questions relating to the percentage allotted his line are settled satisfactorily to him. Officers of the Great Western say their road receives little benefit from being a member of the Trunk Line Committee; that the agreement is no protection whatever against rate cutting, and that the company is just as well without as within such an organization.

Lake grain rates have jumped to 2½ cents a bushel to Buffalo, and the prospects are that they will go higher before next week. Vessels aggregating 500,000 tons have sailed from the lakes to the Atlantic Ocean within the last few weeks to engage in the coastwise coal trade. Usually at this season of the year the vessels that handle ore drift into the grain trade. This fall, on account of a shortage in ore at the mills, these boats have been continued in that service. These factors have caused a big shortage in the number of available vessels for the grain trade, and sent up the rates.

The Executive Committee of the National Live Stock Association has appealed to Attorney General Griggs to prosecute the railroads which are ignoring the Interstate Commerce Commission's ruling on terminal charges at the Union Stock Yards. Legislation empowering the Interstate Commerce Commission to enforce all its rulings is also demanded.

The California limited train of the Atchison, Topeka & Santa Fe will begin its fourth annual season on Nov. 2, when it leaves Chicago westbound, and on Nov. 7, when it leaves Los Angeles eastbound. It will run on Mondays, Wednesdays and Saturdays from both terminals, through the season of California tourist business. One sleeping car will be hauled through to San Diego on a connecting train from Los Angeles. There will be a sleeper between Kansas City and Los Angeles.